

January 10, 1957

The IRON AGE



Air Freight: Metalworking Traffic Soars P. 19

Chips: Signposts For Good Machining P. 59

What Steel Labor Wants In A New Contract P. 22

Digest of the Week P-2



an electric arc

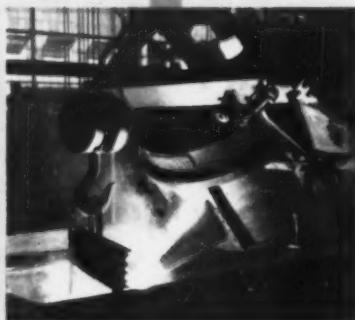
PLUS outstanding engineering developments create a new economy in melting today

The electric arc, a quick, clean source of heat supply for electric furnaces, provides higher thermal efficiency than any other supply of heat. The result is cost reduction and higher quality of product. Whiting Hydro-Arc Electric Furnaces employ this important arc, yet outstanding exclusive Whiting advancements assure a still greater melting efficiency. This is accomplished through the use of a new patented control development that provides a constant arc for automatically heating and melting the charge. Add to this such Whiting features as an automatic electric clamp, simplicity of top charge and air-counter-balanced hydraulic electrode positioning equipment... all contributing to greater savings.

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Write for informative bulletins!

Many hints and suggestions for economical electric arc furnace operation are contained in "Facts on Duplexing" (FO-4), "The Electric Furnace in The Iron Foundry" (FO-6), "The Whiting Hydro-Arc Furnace Control" (FO-10). Send for the copy or copies you need right now! Specify by "FO" number.



How his inventories cut your overhead

To the buyer who needs steel or steel products in small and moderate amounts, the local distributor can often be a great source of economies. He can effect savings for his customers in many ways. Consider, for instance, the matter of inventories.

The distributor is a warehouseman. He has large stocks of plain and galvanized sheets, corrugated roofing, fence, fence posts, nails. Often he carries strip, bars, plates, structural, wire, tool steels, wire rope, and other essential items. These products flow into and out of his warehouse daily. They are always available to the customer — to *you*. In essence they are no farther away than your telephone.

When you look to the distributor to meet your needs, you save the burdensome costs of maintaining large inventories

of your own; costs that include insurance, taxes, handling, special equipment, space required, and clerical help. These items of overhead are far too heavy to be classed as "incidentals." They come to a very large sum, and the customer himself has to bear them if he builds up sizable stocks.

You can avoid the inventory headache — and expense — when you let the Bethlehem distributor fill your requirements. Why not call him and learn how fully he can be of service to you? He has much to offer, and all of it is good.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.
Bethlehem Pacific Coast Steel Corporation
San Francisco



Call the distributor — your Shopping Center for Steel

Jan. 10, 1957—Vol. 179, No. 2

The IRON AGE

Digest of the Week in Metalworking

Starred items are digested at right.

EDITORIAL

You must Still Beat the Bushes! 7

NEWS OF INDUSTRY

★Special Report: You Can Do Business with Air Freight	19
★Manufacturing: Fastener Standards Vary	21
★Labor: USW Gives Preview of Things to Come	22
★Labor: More Fringe Benefits for White Collar	23
★Management: What's Ahead for Steel Users	24
★Business: When Are Machines Obsolete?	26
★Research: Iron Dust Can Make Powerful Magnets	27
★Production: Industry Likes Bigger Openhearts	28
Personnel: Iron Age Salutes	47
Iron Age Introduces	49
Metalworking Briefs	132

NEWS ANALYSIS

Newsfront	17
Report to Management	33
★Automotive Assembly Line	36
This Week in Washington	41
★West Coast Report	43
★Machine Tool High Spots	45

TECHNICAL ARTICLES

★What Chips Really Mean to Carbide Cutters	59
Skin Miller Contours Slabs Automatically	63
★New Line Plates Contoured Parts With Few Rejects	64
★Carbonitride to Aid Powder Iron Properties	66
★Rectifiers Bid for More Metalworking Jobs	70
★Conveyor "Thinks" Its Way Through Handling	72
Technical Briefs	88

MARKETS & PRICES

★The Iron Age Summary—Steel Outlook	107
Steel Products Markets	108
Comparison of Prices	109
Iron and Steel Scrap Markets	110
Nonferrous Markets	114
Steel Prices	117

REGULAR DEPARTMENTS

You Arbitrate It!	86
New Books	87
New Equipment	96

INDEX TO ADVERTISERS

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NEWS DEVELOPMENTS

AIRCRAFT FIRMS STRESS

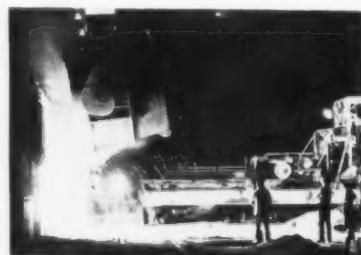
FASTENER STANDARDS P. 21

Airplane manufacturers, with specialized needs and small quantity ordering, are relying on specialty firms to supply their fastener needs.

STEEL LABOR SHAPING

NEW CONTRACT DEMANDS P. 22

The United Steel Workers will be out for substantial contract improve-



Inland Steel Corp. photo

ments when current agreements expire in '59. They include higher wages, shorter work week, better pensions and insurance, and improved SUB.

BENEFITS: MORE FRINGE FOR

THE WHITE COLLAR P. 23

National Office Management Assn. says clerical office workers have gained heavily in fringe benefits in the last 8 years. Office Executive Assn. of New York concurs, points out much of the gain was made between 1955 and 1956.

MACHINES: WHEN ARE THEY

OBSOLETE? P. 26

More companies are going in for scientific methods for deciding when to replace machinery. Survey reveals that many companies have abandoned the old-fashioned "rule-of-thumb" method for figuring depreciation.



AIR FREIGHT—Not long ago, traffic managers used air freight only in cases of emergency. But this week's Special Report — p. 19 — shows real savings can be made by using the air lanes. Shortcomings of young transportation method are being overcome as use grows. (United Air Lines photo.)

OPENHEARTHS: INDUSTRY LIKES THEM BIGGER

P. 28

There are fewer openhearth furnaces in the U. S. now than 10 years ago, but steelmaking capacity is up 33 pct. Producers are finding economies in larger heat sizes. The trend is toward 400-ton furnaces, and the past few years have seen many changes in operating techniques. Weirton Steel has put into operation the biggest of all—a 600-ton giant.

FEATURE ARTICLES

WHAT CHIPS REALLY MEAN TO CARBIDE CUTTERS

P. 59

As signposts of good or bad practice, chips from milling operations are important. They can aid in detecting and curing a number of milling problems. Some key points to notice when using carbide cutters are: chip clearance space, chip shape and size, chip thickness, the method of milling, and vibration. Each of these factors tells a story of its own.

NEW LINE PLATES CONTOURED PARTS WITH FEW REJECTS

P. 64

Diecast parts are copper-, nickel-, and finally chrome-plated on one automatic plating line with less than 2 pct rejects. Complete cycle takes 2½ hrs. In copper undercoating, intermittent current is used—10 seconds "on" and 1 second "off." Parts undergo electrocleaning both before and during plating.

CARBONITRIDE TO STEP UP POWDER IRON PROPERTIES

P. 66

Recently considerable work has been done in carbonitriding iron powders parts in powder metallurgy. Both medium and high density powders were studied. Conclusion: where higher hardness and hardenability are called for, carbonitriding is a helpful tool.

RECTIFIERS BID FOR MORE

METALWORKING JOBS

P. 70

New types of germanium and selenium rectifiers aim to capture a bigger share of the direct current needs in steel-making, arc welding and electroplating. They offer potential users some impressive advantages. These include compactness, safety, efficiency and flexibility.

CONVEYOR "THINKS" ITS WAY THROUGH HANDLING

P. 72

Shuttling parts around in a four-story plant poses two obvious drawbacks to peak production. One concerns various delays; the other involves misdirected loads delivered to the wrong floor. One plant—to eliminate these barriers—installed a vertical elevator, linking it with horizontal conveyors at each floor.

MARKETS AND PRICES

WHAT'S AHEAD FOR STEEL

USERS THIS YEAR

P. 24

Overall supply will be better. But plates and shapes will continue to be tight. International situation indicates no early easing. Sheets and most other products will be available for users. Prices will go up \$5 to \$6 a ton in addition to extras. Steel labor got a 3-cents-an-hour cost-of-living pay boost on Jan. 1.

HOW AUTOMAKERS COPE

WITH 'LEMONS'

P. 36

The occasional faulty car that gets through factory inspection is a problem to automakers. During model change-over years, the frequency is higher. The industry expects automatic assembly equipment will reduce the number of "lemons" that reach the market to an absolute minimum.

STEEL EXPANSION IN FAR WEST

MOVES INTO HIGH GEAR

P. 43

The area's mills, keeping pace with boom, are expanding facilities. Bethlehem, Columbia-Geneva and Kaiser all push programs to increase tonnage. Two million tons of steel products will need to be "imported" in '57.

BIG ORDERS ON WAY

FOR MACHINE BUILDERS

P. 45

After two prosperous peacetime years, the machine tool industry is looking with confidence at 1957 prospects. Reasons for optimism vary from company to company but most see continued expansion as inevitable.

AUTOMOTIVE BUYING WORRIES

STEEL MILLS

P. 107

Steel business is good, but Detroit buyers are still holding back. Automotive is the one big question mark in the steel picture. Meanwhile, prices are still rising. Boosts in extras for bars, light structurals, and plates.

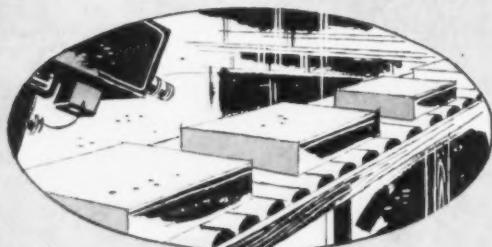
NEXT WEEK:

WHERE COMPUTERS FIT IN METALWORKING

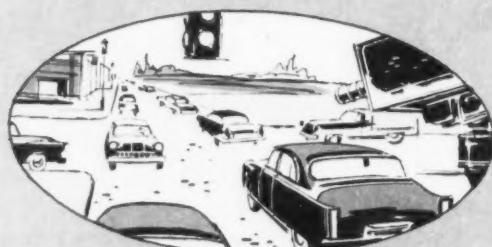
Computers are cutting on an impressive record for themselves in metalworking. This feature article will take a comprehensive look at their applications—present and potential—within the metals industries. (IBM Corp. photograph).



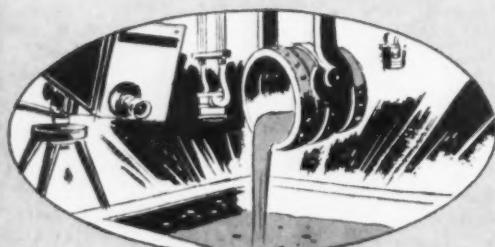
GENERAL ELECTRIC CLOSED CIRCUIT TV PROVIDES RELIABLE VISUAL COMMUNICATION AT LOW COST



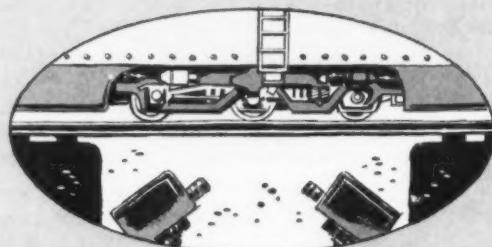
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The basic system is housed in three small, compact units...easy to place, easy to move!



The CAMERA

Type TG-2-A. Takes the picture of subject, scene, or action.

The MONITOR

Type TH-6-A. Shows the picture as taken by the camera. Conventional home-style TV receivers may be used as additional receivers or monitors.



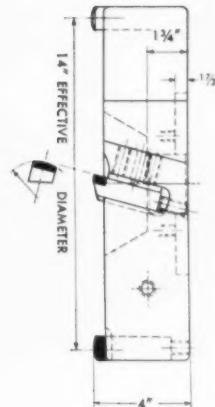
The CONTROL UNIT
Type TH-5-A. Controls and transmits the picture from camera to monitor.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Ingersoll Micromill Finishing Cutter
28800MM Series...Page 29, Catalog 66



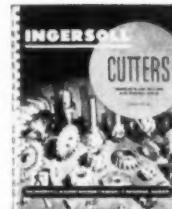
25 Micro Inch Steam-Tight Finish at Westinghouse with this **INGERSOLL MILLING CUTTER**

Where finish is important, look to Ingersoll for the answer. There is an Ingersoll cutter to meet virtually every finish requirement. For example, the cutter shown above is being used by Westinghouse, Steam Division, in finish milling high pressure turbine cases.

The cutters used for this work were developed by Ingersoll's research department and proved on Ingersoll's testing floor.

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Whether you are concerned with cutter costs, feed rates, longer tool life, or finish, the new Ingersoll cutter catalog will be a valuable guide. Write for your copy today, address Dept. 66N.



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17

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also a prime supplier of billets, blooms and slabs — to customer specifications — in Stainless and Alloy grades. For prices — contact the Sharon Steel Corporation, Forging and Semi-Finished Steel Sales Department — or one of the district sales offices listed below.

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Indexed in the Industrial Arts Index
and the Engineering Index.

You Must Still Beat the Bushes!

• THIS WILL BE another great year. Plant and equipment spending will reach new highs. Defense spending may be up \$3 billion or more over a year ago. Foreign aid will be upped.

Charts will show upward trends in most sales even though the rate of climb will not be as steep. There will be times when the oldsters in this "new era" get temporary qualms. But by and large their fears will be groundless.

There are many who believe the millennium is here. These hardy souls quote population increases, growth trends, the need for roads, buildings, schools, churches and homes.

There is every reason to believe the optimists rather than the pessimists—or even the middle-of-the-roaders. Past industrial history supports those who are not afraid rather than those who look for doom. That is true even though the star gazers sometimes let the clouds dim their view temporarily.

As yet no one has discovered automatic sales and promotion that grind on and on. We still need sweat, thoughts and sharp needle jabs into the seat of the problem. You may make all the products you care to but if they do not move you are sunk.

The idea that products and services sell themselves is dangerous thinking. If you don't work at it you may be sure your competitor will. This year will be one of those years that will tell the tale. Sales may be easy but how about the future?

After all, 1958 is coming; so is 1959. We do have built-in safeguards to our economy. Many of these are also built-in complacencies. Pensions, bonuses, winter and summer vacations, health insurance, life insurance, long term mortgages and long range installment buying are supported by selling, promotion, and lower production costs.

You have to beat the bushes all the time for sales if you want to remain known when things are a little tougher. You have to promote continually your product or service if you don't want to become lost in the shuffle.

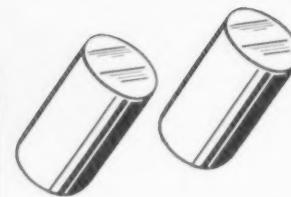
The handmaiden to sales and promotion is lower unit cost. This comes from new equipment, modernizing present plant and improving manufacturing techniques.

There is no other way to stay alive.

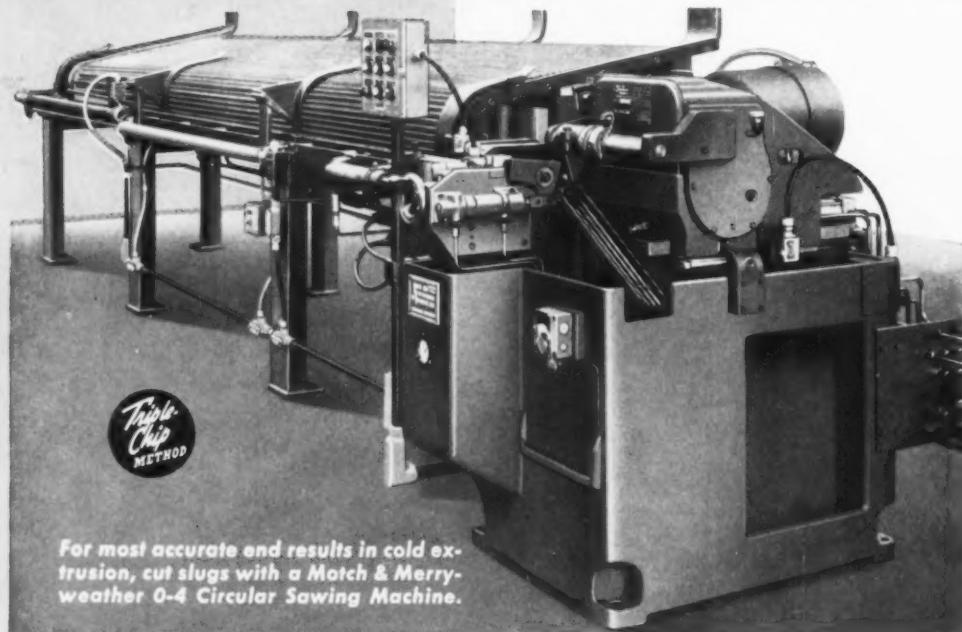


EDITOR-IN-CHIEF

cold cuts



BY MOTCH & MERRYWEATHER



For most accurate end results in cold extrusion, cut slugs with a Motch & Merryweather 0-4 Circular Sawing Machine.

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THE
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Builders of Automatic Precision Cut-Off, Milling and Special Machinery

dear editor:

letters from readers

Creeping Moss

Sir:

It is not unknown on this damp island for moss to develop on the heads of our prissier statesmen. But here is a case where the moss has penetrated clear through and rotted the brains. I quote from the Dec. 15 Birmingham *Mail*:

"Mr. Geoffrey Hirst, Conservative M.P. for Shipley (Yorks.), said at Masham (Yorks.) today he believed the United States should recognize the harm they had done to Britain and the 'gross injustice' of their actions over Suez.

"He thought a gift of \$700 thousand would do something to mitigate the view history would hold of the incident."

No illusions

Hirst typifies the immature thinking of some of our present British rulers. They actually believe America must subsidize and back us, no matter what we do. I want you to know that ordinary men-in-the-street over here have no such illusion. At citizen level we know that handouts and recriminations will do nothing to solve the basic British problem, which is that the economy can no longer afford hereditary blue-bloods, vast arms programs, work-shy workers, and people like Mr. Hirst.

Offers solution

The only solution to current troubles here in Britain would be a national desire and will to do a real day's work in a day. That is the spur in America, and in Germany, and so it should be here. Until it is, neither moral support nor dollar handouts can do anything for us.

All this is known well enough to the average Britisher. But who will get it across to the elite who govern us? We are Britain; they are the

people who connived with France to pull a fast one in Suez when Ike wasn't looking. They are the same people who now expect American taxpayers to come through with financial aid.

In brief—please don't judge the British by the Hirsts among us! *L. H. Day, Bureau of Metallurgical Research, Birmingham, England.*

We also have a great many Hirsts in this country—many of whom have passed through our Congress, and some of whom are probably still there.—Ed.

Show Dates

Sir:

I have just read your article "How Small Firms Get Government Contracts" which appears in your

December 6, 1956, issue. I would appreciate it if you could advise me the dates and places of subsequent shows or direct me to the source of this information.

I note the article states additional conferences will be held in St. Louis January 30 and 31, Chicago, Dallas, Fort Worth, Amarillo, Houston and Phoenix and others. *G. L. Miller, General Mgr., Sand's Level and Tool Div., Hubbard Specialty Products, Inc., Clinton, Ind.*

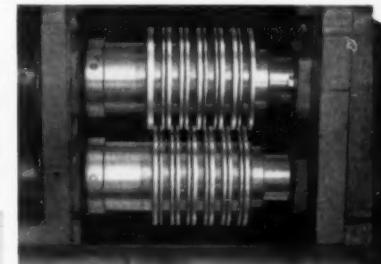
The small business conferences are scheduled by: Small Business Administration, Lafayette Building, Washington 25, D. C. Wendell B. Barnes, Administrator.

These are held in cooperation with local Chambers of Commerce so your nearest big city Chamber's Industrial department should be able to help you.—Ed.

COWLES SLITTING KNIVES

Cut costs 3 ways

Cowles knives reduce set-up time. They are made so accurately they can be assembled on the arbor without shimming. Cowles knives stay on the job longer;—they reduce down-time for re-grinding; and produce straight edged strip with minimum burr avoiding tie-ups in blanking operations.



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TOOLS • STANDARD AND SPECIALLY ENGINEERED TOOLS FOR ALL FERROUS
AND NON-FERROUS PROCESSING, TRIMMING AND FORMING REQUIREMENTS.



WHEELABRATOR® SUPER TUMBLAST

makes cleaning dollars go twice as far at INDIANA FORGE and MACHINE CO.

Automatic batch type cleaning is a reality at Indiana Forge & Machine Co., East Chicago, Indiana where a Wheelabrator Super Tumblast operates without any direct labor. This revolutionary, new airless blast cleaning machine cleans twice the volume of steel and alloy steel forgings in half the time formerly required by two conventional blast machines.

NOW in 3 sizes!

Super 28

Super Tumblast now comes in 3 sizes to extend the advantages of push-button batch cleaning.

Super 14

Super 7

The entire operation is controlled by an automatic timer which is put into action by the trucker by simply pushing a starting button after charging the loader. This not only saves direct labor but helps to compound the savings inherent in the design and construction of the Super Tumblast.

For example, the machine operates only as long as necessary to achieve the cleaning required. The timer permits tumbling of the work to clear pockets and cavities of abrasive. The shaker type conveyor used in unloading is another safeguard against abrasive carryout. Its perforations permit abrasive to fall through into a reclamation

device, and thus keep abrasive consumption to a minimum.

Abrasive costs have been reduced 68% at Indiana Forge & Machine Co. The first set of blades ran 596 hours and no other wearable part has as yet been replaced.

And now Wheelabrator has made these advantages available for more applications by adding two smaller size units to its Super Tumblast line. Whatever your production, there's now a Super Tumblast model to bring you super savings in cleaning costs through increased productivity and automation.

Send for CATALOG 125-D

WHEELABRATOR
CORPORATION

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Mishawaka, Indiana

fatigue cracks

High Flyer

We've always thought our Chicago Editor, Keith W. Bennett, inclined to flights of fancy.

Examples: Pig iron in this area is as scarce as bandmasters in the "Salvation Army" (never got into the book—cranky home office); "She's got a face like a pan full of worms"; and his latest battle cry—after absorbing Dr. Robert Gunnings' book on clear writing—"Gunning Ho!".

But we think he really got off the ground with this week's special report (p.19) on air freight. Keith's top-notch article on metalworking's growing use of this high-speed service is must reading for every company in the business.

Resolutions For 1957

One of our perennial New Year's resolutions is to stop taking ourselves too seriously. It usually lasts about a week—sometimes even more. This year we're shooting for a month.

So as a starter we submit this parody of something dear to all our hearts—management surveys.

"Efficiency" Experts in the Symphony Orchestra

These excerpts from a MANAGEMENT SURVEY of the Utopian Philharmonic Orchestra by the distinguished firm of Search and Search may strike a responsive chord in the souls of all those who have been, are, or are to be surveyed.

... For considerable periods the four oboe players have nothing to do. Their number should be reduced and the work spread more evenly over the whole of the concert thus eliminating peaks of activity.

"All the 12 first violins were playing identical notes. This seems unnecessary duplication. The staff

of this section should be drastically cut. If a large volume of sound is required, it could be obtained by means of amplifier apparatus.

"Much effort was absorbed in the playing of 16th notes. This seems an excessive refinement. It is recommended that all notes should be rounded up to the nearest quarter. If this were done, it would be possible to use trainees and lower grade operatives.

There seems to be too much repetition of some musical passages. Scores should be drastically pruned. No useful purpose is served by repeating on the horns a passage which has already been played by the strings. It is estimated that if all redundant passages were eliminated, the whole concert time of the two hours could be reduced to 20 minutes and there would be no need for intermission.

"The conductor agrees generally with these recommendations but expresses the opinion that there might be some falling off in attendance. In that unlikely event, it should be possible to close sections of the auditorium entirely with a consequential saving of overhead expense, lighting, salaries for ushers, etc."

Thanks to Milton W. King in the December issue of National Symphony Orchestra notes.

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dates to remember

JANUARY

American Electroplaters Society—Winter meeting, Jan. 12, Sheraton Penn Hotel, Pittsburgh. Society headquarters, 445 Broad St., Newark 2, N. J.

Institute of Steel Iron & Steel, Inc.—Annual convention, Jan. 13-16, Eden Roc and Fontainebleau Hotels, Miami Beach, Fla. Society headquarters, 1729 H St., N.W., Washington, D. C.

Society of Automotive Engineers, Inc.—Annual meeting, Jan. 14-18, The Sheraton-Cadillac and Statler Hotels, Detroit. Society headquarters, 29 W. 39th St., New York.

EXPOSITIONS

American Society for Metals—March 25-29, Los Angeles.

American Foundrymen's Society—May 6-10, Cincinnati.

The Society of Plastics Engineers, Inc.—Annual national technical conference, Jan. 16-18, Hotel Sheraton-Jefferson, St. Louis, Mo. Society headquarters, 34 E. Putnam Ave., Greenwich, Conn.

Steel Plate Fabricators Assn.—Annual meeting, Jan. 17-18, Palmer House Hotel, Chicago. Assn. headquarters, 79 W. Monroe St., Chicago.

Malleable Founders' Society—Semi-annual meeting, Jan. 18, Hotel Cleveland, Cleveland. Society headquarters, 1800 Union Commerce Bldg., Cleveland.

Compressed Gas Assn., Inc.—Annual meeting, Jan. 21-23, Waldorf-Astoria, New York. Society headquarters, 11 W. 42nd St., New York.

American Standards Assn.—Gaillard seminar on industrial standardization, Jan. 21-25, Engineering Societies Bldg., New York. Society headquarters, 70 E. 45th St., New York.

American Boiler Manufacturers Assn., & Affiliated Industries—Mid-winter meeting, Jan. 22, Hotel Statler, Cleveland. Assn. headquarters, 1571 W. 117th St., Cleveland.

Industrial Heating Equipment Assn., Inc.—Annual meeting, Jan. 28-29, The Shoreham Hotel, Washington. Assn. headquarters, 1145 19th St., N.W., Washington, D. C.

Cutting Tool Mfrs. Assn.—Annual meeting, Jan. 29, Detroit Yacht Club, Detroit. Assn. headquarters, 416 Penobscot Bldg., Detroit.

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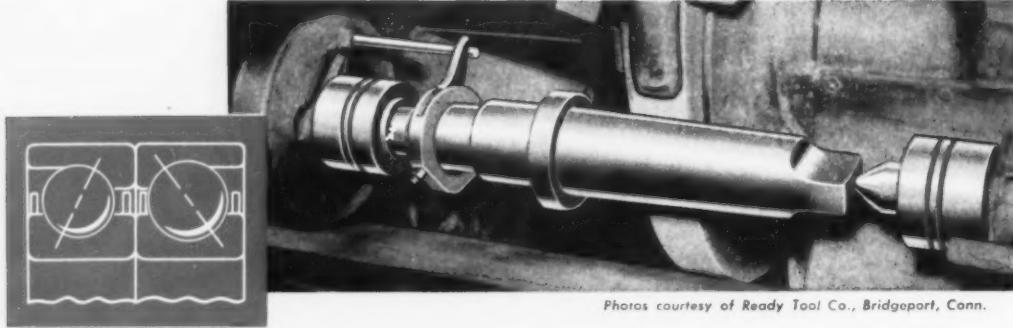
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FACTS

about

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Photos courtesy of Ready Tool Co., Bridgeport, Conn.

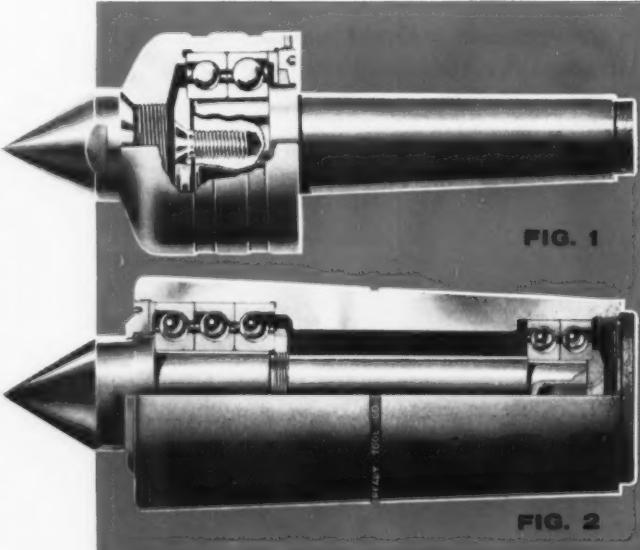
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New Departure ball bearings for live center applications are made to ultra-precision tolerances. Smooth operation with low frictional loss is assured, as well as continuity of accuracy throughout long life. Write for further details.



(Fig. 1) Tapered-shank, spindle-type center in which New Departure ABEC 7 specification duplex ball bearings support grinding loads with undiminished accuracy throughout long use.

(Fig. 2) Enclosed spindle designed around five New Departure ultra-precision preloaded duplex ball bearings.

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NEWSFRONT

Titanium: Going Ahead Anyway

At least several titanium sponge producers are pushing ahead with plans to boost their productive capacity without fast-tax writeoffs or other government aids. Some Washington circles see it as fresh evidence that aids are nice, but not vital; that today's surging demand for nearly all basic industrial commodities means industry can go-it-alone building new capacity.

Hot Method Saves Cooling Water

A water-short German steelworks has cut its cooling water consumption on blast furnace tuyeres to 1/60th its former requirements, and gets process steam as a bonus. The method utilizes hot spots to generate steam, by slowing down rate at which cooling water feeds, so some boils. Some heat energy dissipates, turning water to steam to help cooling. Soft makeup water feeds at 5 atmospheres pressure.

Have To Measure Coating Thickness

A thickness gage small enough to fit comfortably in the palm of the hand is now out. It utilizes a permanent magnet; makes fast, accurate, non-destructive checks on thickness of non-magnetic materials bonded to smooth iron or steel. Paint coatings, platings, enamels are typical materials measurable. Low range of the double range scale runs zero to 0.007 in.; high scale covers 0.001 to 0.060 in.

Castings: Information Program Coming

Watch for fresh outpourings of information soon on castings, result of a foundry industry survey of customers. Questionnaires indicated many buyers and users have wrong information on properties and characteristics. Example: more than half incorrectly thought outdoor aging improves machinability of cleaned grey iron castings.

Production Fluctuations: Any Way Out?

The tight labor market is one factor in the widespread move to find some escape from ups and downs in production operations. Tacks taken include: more warehousing, better analysis of

sales patterns, subcontracting for smoother control. Where the labor factor figures in: it's sometimes tough getting laid-off men back, particularly in the more skilled jobs.

Billets Continuously Cast at 200 IPM

A British firm is continuously casting commercial-quality, mild steel billets at speeds better than 200 ipm. The pilot plant operation can produce billets from 2 to 4 in. square; slabs up to 6 in. by 2 in. in cross section. The company reports continuously cast carbon steels have shown good forging characteristics, says high-quality sheets have been rolled from continuously cast stainless slabs.

Weld Deposition Costs Going Down

Costs for fabrication of weld-deposited metals, mostly by shielded arc, may fall sharply this year. One maker of such equipment already admits being priced out of the market by newly-evolved, low-cost automatic welding techniques for putting expensive alloy tank liners over low-cost carbon steel. Expectation is that cost of such tanks are due to dip.

Titanium's Getting Cheaper

Further reductions in the price of titanium mill products are shaping up. Cut twice last year, prices of titanium sheet, strip, barstock and plate are down 10 pct from early '56 figures. Production economies and increasingly tough competition will squeeze prices further in months ahead. Watch, too, for progress towards a continuous reduction process.

Wage Climbs May Clobber Costs

Wage rises this year can play hob with your cost estimates, if you're not under "off-year" contract protection. Informed Washington opinion sees a 10¢ to 15¢ extra hourly tab as the price of peace with unions which win new wage agreements. Another problem—the longshoremen's strike—may demand strong measures if it's unsettled by Feb. 11 injunction deadline.



Five Cleveland Worm Gear Speed Reducers, in view, are engaged in driving the layout table for these Heat Treating furnaces. Sixteen others are in use on other parts of this line, built by the Drever Company, Bethayres, Pa., and installed in the plant of Lukens Steel Co., Coatesville, Pa.

Largest continuous plate line ever built employs 21 CLEVELANDS

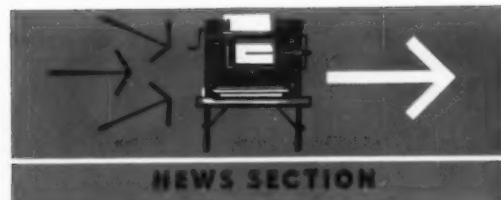
THE drives will never be a problem on this, the largest continuous heavy plate line ever built. Twenty-one Cleveland Worm Gear Speed Reducers assure smooth, uninterrupted transmission of power from smooth, table mechanism in this Heat Treating furnace line.

Cleveland worm gear speed reducers are ideally suited for an installation of this magnitude. Space is saved by the compact Cleveland design. Installation is easy and maintenance is negligible. You'll find Clevelands throughout the steel industry, in every phase of operation. And, in case after case, Cleveland speed reducers have proved to be so dependable and long-wearing that they outlast the machines they drive.

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NEWS SECTION



Lockheed Photo

You Can Do Business With Air Freight

Air freight no longer means emergency measures . . . To traffic managers, it can mean real savings . . . Studies show use of air lanes can cut inventory and many other costs—By K. W. Bennett.

◆ AIR FREIGHT lines mean business in 1957. At least 10 pct more than the record tonnage of air cargo hauled in 1956 will reach its destination via the air lanes this year.

In the next decade, it's predicted that the 325 million ton-miles of air freight hauled in 1956 will climb to 800 million ton-miles by the end of 1965.

The airlines have a freight service to sell. It can save the customer money. It is paying a return to the airlines themselves. And metalworking is an increasingly eager customer.

Hard Sell

How are airlines selling their service? A good case can be made that if warehousing and handling costs are studied carefully, the shipper can often be shown real economies in air transport.

Harvard's Graduate School of Business Administration has de-

veloped and published a formula. American Airlines, biggest of domestic freight haulers, jumped in with a \$200,000 sales training program to acquaint its freight salesmen with the results of this and other studies.

Here are some case histories:

An electronic tube manufacturer maintained two warehouses with a 60-90 days inventory. By reducing warehouse inventories and depending on quick air transport, it was possible to reduce inventories by \$1,762,000.

Reduction in inventory taxes, reduced insurance costs, plus interest on the released capital, demonstrated a savings of \$78,983 over a six months period.

In the case of a midwestern pump manufacturer with seven regional warehouses, \$1,680,350 in inventory capital was released. Reductions in fees, interest, insurance, auditing costs, and others, indicated a net savings of

\$97,000. Six warehouses were abandoned.

There are other points to be used in an air freight sales campaign: Reduced packaging costs, expansion of a sales area through quick delivery to distant points, or moving into a new sales area on a trial basis without building major warehouse facilities.

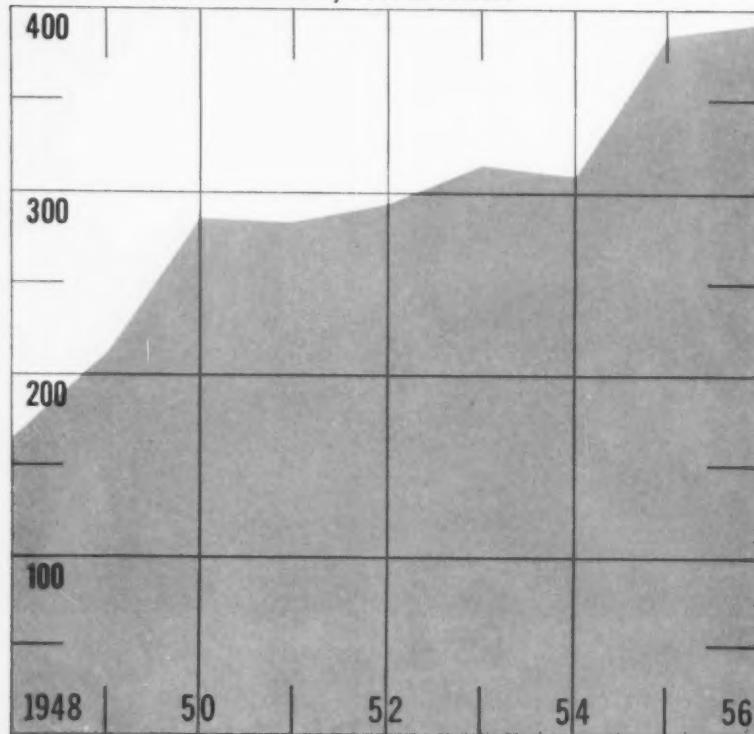
Needs Selling

But the heavy promotion of air freight as a cost-cutting device has not yet begun. Many think it is needed. The majority of freight managers regard air freight as an emergency device. But all agree that an increasing tonnage of their output is moving by air. This includes nearly all fields of metalworking.

In the Chicago area alone, Fairbanks-Morse, Joseph T. Ryerson, Barber-Coleman, John Deere, Clark Equipment, International Harvester, Admiral, Raytheon,

Air Freight Gains Altitude

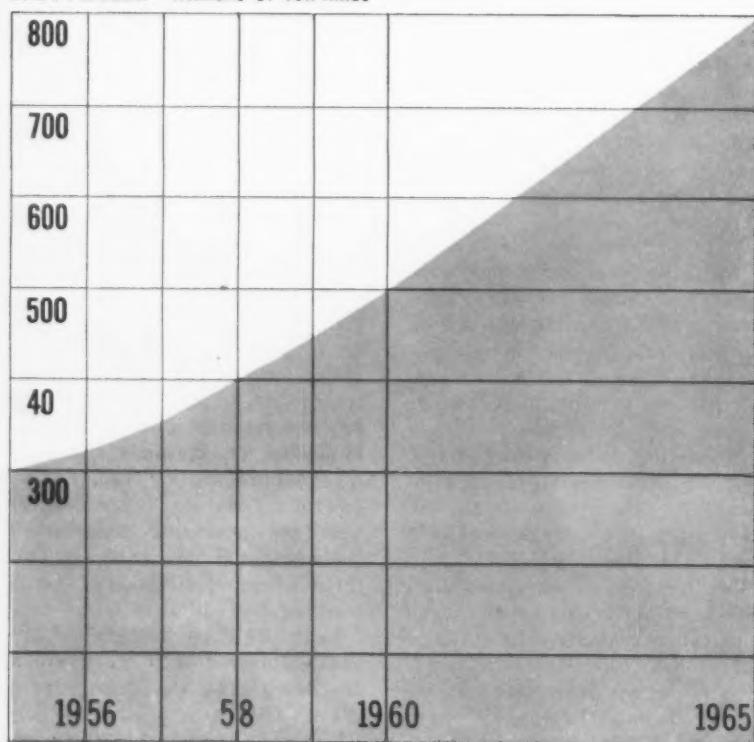
Thousands of Net Tons handled by U. S. air carriers



1956 Fiscal year only. Source: CAA

Charting Air Freight's Course

CAA Forecast—Millions of ton-miles



Howard Foundry, J. I. Case, to name a few, all move freight by air regularly.

These companies represent a wide cross section of the metal-working market.

In most cases, shipment is made at the customer's request. Rather than "emergency" shipments, they are called "expediting" shipments. The customer has agreed to pay the additional freight costs to receive his order more quickly.

Space Needed

Most would ship more if more cargo space was available. Says one typical traffic manager:

"I spent all weekend looking for air cargo space to ship ten refrigerators to Dallas. Now I just got an order to ship ten more to Rockford. So I start all over again looking for space."

Air freight is being used to crack export markets. One international air shipper is beefing foreign sales by offering one week delivery of electronic equipment. By water, it would require three to four weeks. His foreign distributors, assured they can carry less inventory and that they need not plan as far ahead or commit as much of their capital for inventory, are beginning to boost their sales.

The amazing side of air freight is that it has gained so much ground in the face of (1) need for more cargo space, (2) need for more frequent, scheduled freight runs, (3) a higher cost than surface transport, and (4) continuing feeling among freight managers that air freight is a premium service.

Some customers are even ordering their material by air express, at higher than air freight rates.

Meet Criticism

Airlines are meeting these shipper criticisms. The frequency and capacity of cargo runs picked up sharply in 1956 and will do so again in 1957. The job is to sell the freight manager on other savings.

To meet the demand for more space and more frequent scheduled flights, air freighters are increasing their capacity to haul.

Flying Tigers has 10 Super Constellations ordered, worth \$22 million, due for 1957 delivery.

United in 1954 boosted cargo-passenger capacity by 14 pct and put on five new all-cargo DC-6A's, each with a 30,000-lb load capacity. The line will increase cargo capacity by 18 pct in 1957. At least 331 big ships are on order for 1956-1958 delivery. All will have some cargo space. At least 45 will be all cargo.



United Airlines Photo

Air freight rates have been coming down. To make money, the airline must use late model ships. On future freight rates there is a difference of opinion. One school advocates moving up rates to cover current expansion costs to a greater extent. The other, viewing recent railroad freight rate increases, advocates holding rates at present levels to lure business from other carriers.

New Ideas

Airlines are also expanding freight services. Slick's "Operation Condiv" is an example. The division's sole job is to promote charter flights for industrial accounts on a regular basis. The same airline has reduced its minimum to \$1 to build a small package freight business.

A recent agreement between Greyhound Corp. and 16 airlines and two freight forwarders will bring in small package freight to and from 6000 communities untapped by air freight at present.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., THE IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

MANUFACTURING

FASTENERS: Standards Vary

Aircraft buyers, with special needs and small quantity orders, rely on specialty producers . . . Old-line manufacturers seek to keep in the swim.

• THE AVIATION industry—now top U. S. manufacturing employer and third ranking in sales—is out to push its own standards in fasteners and other components. Fasteners are the most volatile item at the moment. Other are electrical switches and equipment, hydraulic fittings, and bearings.

Airplane builders are now getting the bulk of their fasteners from about a half dozen specialty producers, many in the greater Los Angeles area. Many old-time fastener producers are often not invited to bid on business.

At the moment, there is a lack of communication between old-line mass-producers of fasteners and the aircraft industry. The Air Force is trying to do something about this by setting up a series of symposiums with the Industrial Fasteners Institute and its membership. Titanium fasteners will

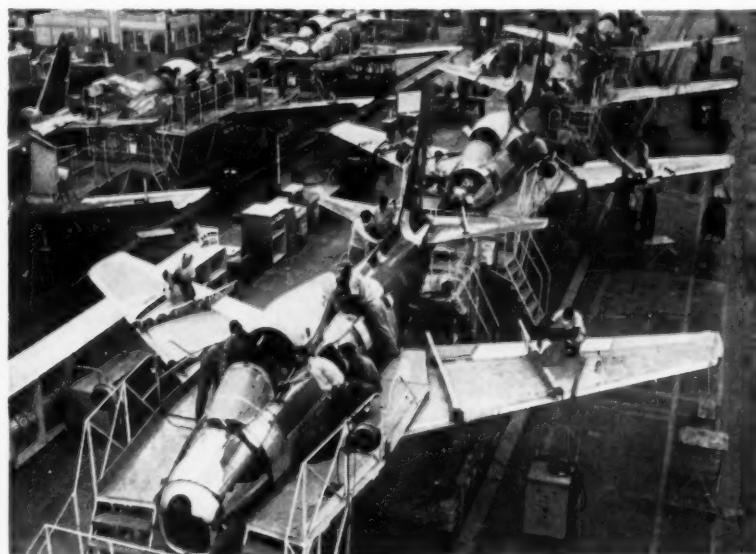
be taken up at the first of these sessions early this year.

Custom Tailoring

The old-line manufacturers are interested in catching up with things because if production were to jump to wartime schedules they would bear its brunt. At their present state of participation it would require a year to tool up.

The major stumbling block is that small orders for aircraft fasteners don't add up to minimum quantities for the mass production fastener plants. So aircraft plants have developed their own specialty producers who custommake them according to aircraft drawings and specifications.

Mass production fastener makers feel they could cut the cost of aircraft fasteners in half if they could get the aviation firms to agree on a set of standards among themselves.



MORE THAN 8000 fasteners are used in airframe of this FJ-4 Fury Jet from North American Aviation. There are additional fasteners in the engine.

McDONALD: Preview Of Things To Come

Steel labor will want more of everything when current contracts expire in 1959 . . . Emphasis will be on shorter work week . . . Regional meetings have political tone . . . Gains since '37 outlined—By J. B. Delaney.

◆ LESS THAN six months after signing a three-year contract, steel labor is mapping strategy for its next set-to with steel producers.

What it adds up to is: more of everything.

But Dave McDonald and his United Steel Workers are thinking especially hard about a shorter work week. This is something that has been talked about for years. But more pressing demands pushed it into the background.

Here are a few of the reasons why a shorter work week — or something equivalent — will be high on steel labor's list of demands when the present contract expires in 1959:

1. Automation in steel is limiting the growth of union membership despite continued expansion

of steel capacity and production.

2. The union feels that advances in industrial technology make it possible to reduce working hours without reducing worker income.

Three Approaches

There are three possible approaches to the short work week: (1) reducing the 8-hour work day, (2) reducing the 5-day work-week, and (3) increasing paid vacation time to reduce net working hours over a year or a period of years.

The union is certain to ask for more in the way of premium pay, vacations, pensions and insurance, supplemental unemployment benefits, and paid holidays.

In the first of a series of six regional conferences, steel union leaders talked over current contract problems and past achieve-

ments dating from the first contract with Carnegie-Illinois Steel Corp. in 1937. Future goals also were sketched out to give local union presidents and district directors something to think about until next contract time rolls around.

Political overtones of the regional conferences were apparent even before the initial meeting in New York Jan. 3-4. They were planned against a backdrop of dissension over a \$2-a-month dues increase voted at the union's convention in Los Angeles last September. Insurgents within the union have nominated a local union leader to oppose Mr. McDonald for the presidency in the quadrennial referendum next month.

Breach Healed

But the dues revolt apparently has served to heal a breach between Mr. McDonald and Joseph Molony, district director for New York State. Mr. Molony told the meeting he was going down the line for re-election of Dave McDonald despite their past differences. These differences prompted Mr. Molony to oppose McDonald's hand-picked candidate for the union's vice presidency several years ago. Molony lost but the election showed up several hotbeds of opposition to McDonald policies.

The candidacy of the insurgent local union leader Don Rarick, for presidency of the union is a losing cause. He's certain to be defeated. Even so, the development has made McDonald and his aides unhappy. If the protest vote is large enough, it could weaken McDonald's position and make him vulnerable to more formidable opposition four years hence.

Long-Term Contract Creates Union Problem

■ **The three-year contract between the United Steel Workers and steel mills has its advantages. But it also poses some unexpected problems for steel union leaders.**

■ **One of these problems is that of reminding union members of the gains they have won through the union. Thus the series of regional conferences started last week by the union. Although working panel sessions serve to clarify knotty problems in contract administration, the meetings also are aimed at maintaining member interest during the long interim between contract negotiations. It's likely that more such meetings will be planned between now and 1959.**

■ **Here's the present conference series schedule mapped out by union leaders: New York-New England conference, New York City, Jan. 3-4; Pennsylvania-New Jersey-Maryland conference, Philadelphia, Jan. 11-12; Midwest and Southern conference, Chicago, Jan. 14-15; West Coast conference, San Francisco, Jan. 18-19; Ohio-West Virginia-Kentucky-Indiana conference, Cincinnati, Jan. 24-25. A Canadian conference will be held this spring.**

BENEFITS: More Fringe For White Collar

Surveys indicate clerical workers have made substantial gains in fringe benefits . . . Merit raises attain wide acceptance . . . Insurance types get wide approval, although employees contribute.

♦ THE CLERICAL office worker gained heavily in many fringe benefits in the past eight years. But during this time he has lost ground in several. The net result: definite gains in total benefits, and in equitability of distribution.

The National Office Management Assn. quizzed 4900 companies in all parts of the U. S. Results compared with its initial poll in 1948 to come up with the statistics leading to these conclusions.

More for Merit

Office Executives Assn. of New York surveyed a cross section of 108 firms to pin-point the degree of change which occurred between 1955 and 1956.

The big gain, according to both surveys, was granting pay increases based on merit. The main benefits in which white collar workers lost ground were profit sharing and incentive wages.

NOMA found that 95 pct of white collar staffs are now eligible for merit raises. In 1948 the poll showed only 31 pct of the firms granted clerical help this benefit.

Recent Development

Office Executives Assn. of New York survey indicates the move to merit gained much of its momentum in recent years. In 1956 almost 52 pct of the firms polled had adopted the practice. In 1955 acceptance was limited to 38 pct.

The National Office Management Assn. reports companies with profit sharing plans make up only 19 pct of industry, compared to 22 pct in 1948.

The Office Executives Assn. of New York poll says only 9 pct of the cross section have profit sharing plans, down from over 10 pct in 1955.

NOMA reports incentive wages are paid in 10 pct of the plants replying to its survey, but has no basis of comparison since the question was not asked in 1948. The New York group pegs incentive much lower at about 3 pct down from 4 pct in 1955.

Employees Contribute

NOMA assigned fringe benefits to one of three categories; insurance type, monetary type, and leave type. Insurance type proved to be most popular. A large majority of industry offers some form of life, hospital and health insurance. However in the majority of cases, employees pay for at

least part of the cost, and in many cases for all.

The national survey also indicates that only 5 pct of the firms have had white collar workers who were members of a labor union. Statistically, this is down from the 6 pct in 1948. But the association regards this as a change in manner of interpretation rather than an actual loss.

In the overall picture, the size of the company involved has little effect on total benefits. Medium sized offices benefit more in monetary types than either large or small business. But the medium group trails the other two in insurance benefits.

MORE BENEFITS FOR MORE EMPLOYEES

Benefit (Pct. of Companies)	1948	1956
Group Life Insurance	77	84
Group Hospital, employee	81	97
Group Hospital, dependent	*	94
Health and Accident Insurance	*	60
Pension	53	66
Guar. Annual Wage	7	9
Seniority Increases	17	56
Merit Increases	31	95
Jury Duty	70	79
Sick Leave	83	95
Severance Pay, involuntary	49	63
Profit Sharing	22	19

*Not Queried

NOMA Survey

MANAGEMENT

FORECAST: What's Ahead for Steel Users

Overall supply situation is good . . . But plates and shapes will be tight for an indefinite period . . . Prices will go up \$5 to \$6 a ton in addition to extras . . . Tax aid seen—By Tom Campbell.*

♦ THERE WILL BE enough steel sheets to go around in 1957. But a lot of people are going to be left out when the plates and shapes are passed around.

The international troubles will hit the domestic steel market hard before faces are properly saved in the Middle East—and elsewhere. The passwords: tankers, pipe and ships.

Steel customers are going to pay more for steel this year. They will get the news via increased extra charges. They also will get the price word on July 1, when steel wages go up. Then there will be a general across the board base increase of from \$5 to \$6 a ton. Some base prices have already risen on the basis of higher material freight costs. Also, steel labor got a 3-cents-an-hour cost-of-living pay boost on Jan. 1.

Steelmakers are getting it in the

neck with their own raw materials costs—with more to come. Labor, coal, fuel oil, scrap, transportation, expansion, machinery and other equipment—all are higher on steel makers' bills. The end isn't in sight.

There is something oddly familiar about all this. Can it be that this is where you came in? It is, but the picture is a little different. There will be no hysteria in steel this year. Over-all supplies won't be so short. But specifically, we will have the shortest supply of plates and shapes since Korea.

The auto people are loaded for bear for at least 3 more months. And if car sales hold up as now indicated, auto steel needs will remain heavy for 6 months. That's the rub. Auto firms never got far off the ground in November and December.

Strategic needs may be showing up real soon. The Suez explosion put emphasis on tankers. That's the case whether or not the "ditch" is reopened. Long term

chances can't be taken again. That means more steel—as much as 750,000 tons for the 50-large-tanker program.

But the tankers are only part of the new urgency put on the steel market in 1957. Plate will be needed for tanker repair as well as for new tankers. Plate will be needed for pipe lines which must be rushed because of the international oil picture. Pipe will be needed for new drilling programs not scheduled before the Suez outburst.

This pressure on the steel market is in addition to the heavy requirements for plant and equipment, freight car building, containers, automotive, oil and gas expansion (planned), school and church construction. Because it looks as if automakers will reach a minimum 6.6 million car sales year, the first half should produce close to capacity steel output.

Vacation Factor

For 1957 as a whole, the steel industry will turn out 120 million tons, as compared with 115 million tons in 1956, despite the five-week strike.

The summer letdown this year will be due mainly to mass vacations. These have become a pattern now. Paid vacations run to three weeks or more. The steel rate could sag to 80 per cent in the third quarter.

The steel industry is not in for a recession during the latter part of 1957. The experts look for a "downward" trend, but few of them have called the figures. There is as good a chance for a mild decline as there is for a deeper drop.

A major steel problem this year is getting the expansion project off to a good start. The capacity

Tom Campbell Predicts

For the long pull, 1957 will reveal more clearly that:

The steel industry has matured, but is still growing in basic strength.

Distribution of steel capacity will be widespread without losses to older major steel centers.

Raw material problems have receded to the background.

Tough nuts to crack, as seen through 1957 glasses, are:

A shortage of management material.

Possible lack of a strong, dynamic personal leadership in the industry—although this may be rectified soon.

Inability to transmit the lusty risk-taking characteristics of "old heads" to new leaders.

figure as of January 1, 1957, was about 133.5 million tons. But part of that did not reflect new equipment, it represented better performance of existing equipment.

New Amortization Bill

Steel expansion programs called for 5 million tons a year for the next three years. It is doubtful if this goal will be reached in that time. There is a good chance that the Administration may foster a new amortization bill this year. Such a law would be less drastic than the five year write-off but better than the present antiquated setup.

Whether or not there is a new rapid amortization bill, the steel industry must raise money either by earnings, by depreciation or by higher prices for expansion. The answer probably will come by a combination of all three. Certainly before the next few years roll around a much better amortization law will be on the books.

Better Earnings

The industry has licked its long-term ore problem. There is enough ore coming from taconites and from Canada and South America to take care of the industry's expansion programs. One thing that could adversely affect the ore outlook would be heavy tax and negative fiscal policies abroad or in our own ore producing states. For the foreseeable future this is unlikely.

Jones & Laughlin Steel's contemplated new steel mill in Texas points up the trend to the Southwest.

No Mass Migration

The rapid growth of taconite production stopped any partial movement—if there ever was one—of the steel industry to the East coast. Depletion of the Mesabi ores led some "experts" to predict such a trend. But the availability of cheap open pit ore from Canada and from South America has encouraged East Coast plants.

For the immediate future, 1957 steel output will reflect: normal growth, buying for inventory, expansion in plant and equipment, resumption of farm buying and reaction to international tensions.

MANAGEMENT

PENSIONS: How Funds Grow

U. S. corporation pension funds are growing . . . Rate indicates assets will pass \$18 billion this year . . . Funds are big investors in corporation stocks and bonds.

◆ ASSETS in pension funds in U. S. corporations reached \$14.2 billion in 1955.

This fat total represents an increase from slightly less than \$7 billion in 1951. It means a 100 pct climb in the space of four years.

These totals on corporation funds are disclosed in a statistical study by the Securities and Exchange Commission. It covers all corporate pension funds except those administered by insurance companies.

Still Climbing

Although the study extends only through 1955, rate of increase of receipts indicates (see table) that assets will reach 18 billion by the end of 1957. At the close of 1956, total assets were probably in excess of \$16 billion.

Market value of total assets is even larger. In 1955, the survey discloses, the market value of pension assets reached \$15.9 billion.

How is the money invested? Distribution of funds in 1955 shows \$10.7 billion invested in

corporate bonds and stocks; \$2.5 billion in U. S. Government obligations; \$300 million in cash and bank deposits; and slightly less than \$700 million in other assets, including \$150 million in mortgages.

More Stocks

Largest share of the total, 51 pct, is in corporate debt issues. However, the trend indicates a larger interest in common stocks.

Corporate pension funds purchased \$610 million of common stock in 1955. This compares with \$590 million in 1954, \$440 million in 1953, and \$290 million in 1951.

Breakdown of corporate assets by industry shows manufacturing far in the lead in pension fund activity. Assets of pension funds held by manufacturing companies reached \$8.731 billion in 1955. Communication industry held \$2.294 billion; and trade company assets \$1.205 billion. No other group passed \$1 billion.

Receipts and expenditures for funds from 1951-1955 are shown on the following table:

Corporate Pension Funds

How They Grow, Where They Go

(in millions of dollars)

	1951	1952	1953	1954	1955
Employer contribution	1,257	1,392	1,681	1,648	1,803
Employee contribution	129	153	176	191	222
Income from interest and dividends	189	247	313	409	463
Net profit on sale of assets	.....	.....	.....	.....	84
Other income	.....	.....	.....	.....	12
Total Receipts	1,575	1,792	2,170	2,248	2,583
Benefits paid out	220	263	314	357	447
Expenses	5	7	8	8	14
Net Receipts	1,350	1,522	1,848	1,883	2,122

BUSINESS

MACHINES: When Are They Obsolete?

More companies are going in for scientific methods for deciding when to replace machinery . . . A MAPI survey reveals that great changes are taking place in this area of management . . . Reliance is on formulas.

◆ FIGURING OUT a fair depreciation rate for a new machine by rule-of-thumb can be satisfactory if you have years of experience and if you are lucky.

But more and more, those whose job it is to decide how much a machine should produce, how much it depreciates, and when it should be replaced are relying on formulas for the answers.

In fact, during the past decade, a minor revolution has been taking place in this once backward area of management. Equipment policy is becoming a science.

MAPI Survey

A survey of 291 producers of capital equipment by the Machinery and Allied Products Institute shows that 21 pct fail to make a regular review of equipment. And 46 pct do not have a staff or individual who is responsible for studying the economic advantage of re-equipment.

These figures are high, but in 1948, when MAPI made its last previous survey, they were even

higher—65 pct and 72 pct, respectively.

When management relies on rule-of-thumb and decides that a new machine should pay for itself, say, in two years, the calculations have two basic disadvantages:

(1) If too few years are chosen, the rule makes excessive demands on new equipment and (2), there is no criteria to tell what period to use.

Wider Choice Now

Although the rule-of-thumb method is not necessarily inaccurate, it is unscientific, MAPI says. Formulas are more involved, but they take the guesswork out of retooling. In the long run they save time, money and the qualms of uncertainty.

The MAPI survey points out that in 1948 the taxpayer was given the choice of two methods of depreciation: straight-line, and declining balance at one and one-half times the straight line rate. The result was that only the straight-line method was used.

With adoption of the Internal Revenue Code of 1954, the taxpayer was granted the option of choosing from among several methods of depreciation—straight line, double-declining balance, and sum-of-the-digits.

"The shift to the new methods is remarkable," MAPI says. Roughly, two-thirds of the polled companies have adopted either the double-declining balance or the sum-of-the-digits method.

The survey pointed up the fact that industry is concerned with the underdepreciation of assets resulting from more than a decade of inflation. It is in this area that a sizable segment of the capital goods producers believes that further improvement in the tax structure is desirable, according to MAPI.

Tax Reforms Wanted

When asked "What measures to reform present tax depreciation do you favor?" 120 firms said they wanted (1) the adoption of a more liberal policy with respect to service lives and depreciation rates or (2) a purchasing power adjustment in tax accounts to compensate for underdepreciation from inflation.

In response to the question "What proportion of your customers have personnel charged with special responsibility for preparation of studies to determine economic advantage of re-equipment?" half of the machinery makers replied 40 pct or above. In 1948 only 35 pct made a similar reply.

In the area of equipment replacement, 42 pct indicated they used the pay-off period method; 19 pct, the MAPI method; 8 pct, minimum average cost; and one pct, discounted-cash-flow.

How Industry Scraps Its Machines

■ Machine tool users are going in for scientific management in a big way. A survey of 291 capital goods manufacturers by the Machinery and Allied Products Institute indicates that many are abandoning the old fashioned "rule-of-thumb" method for figuring depreciation and re-equipment needs. Instead, they are using mathematical formulas.

Some of the more popular methods for deciding when a machine should be replaced:

Pay-off period requirement.
Rate of return requirement.
Minimum average cost.
MAPI method.
Discounted cash flow.

■ For determining depreciation rates, the straight-line method was almost universally used in 1948. The MAPI survey shows that today use is equally divided between straight-line, double-declining-balance, and sum-of-the-digits methods.

These tabulations, MAPI says, appear to confirm a trend toward a more dynamic equipment policy. The impression is reinforced by responses indicating widespread adoption of capital budgeting, forecasting and record-keeping practices.

The Institute points out as significant the proportion of machinery manufacturers assisting their customers in financing the purchase of their products.

In this respect, installment selling, used by 24 pct; accepting used equipment as part payment, 11 pct; and placing machinery in customer plants on a rental basis, 14 pct, has changed little since 1948. It appears that these types of financing programs have become more formalized.

New Warehouse Home

United States Steel Corp.'s Supply Div. has purchased the Chicago Hegewisch Ordnance Div. plant of U. S. Industries, Inc.

Plans call for the eventual concentration of USS Supply's Chicago warehousing operation at the new location, now used for tank and armored vehicle processing. At present, warehouse operations will continue at the firm's Wabansia Ave. location pending completion of improvements at the new quarters. Some operations will be carried on indefinitely at the Wabansia location.

Acquisition of the new property, totalling about 1.2 million sq ft, will double USS Supply's Chicago warehouse space.

Atomic Complications

Special housing is required for the new plant under construction by the Griscom-Russell Co., Massillon, O. It is needed to provide the unusual sanitary temperature and security conditions for development of products for the Atomic Energy Commission.

The company, a subsidiary of the General Precision Corp., specializes in design and manufacture of heat exchangers for industrial applications research in all fields, including nuclear energy. The 100 by 120 ft building will be on a site adjoining the present main plant.

MAGNETS: Iron Dust Has Power

It's still in the development stage, but G. E. is perfecting a new magnetic material . . . Strength potential is higher than conventional types . . . Easily machined.

◆ A NEW TYPE permanent magnet being developed by General Electric Co. scientists is opening the door to possible tremendous advances in instrument design.

Made from sub-microscopic iron dust, these magnets already have been produced in the company's West Lynn, Mass., instrument laboratory and are equal to the strongest commercial magnets now in use. They have a theoretical strength 10 times that of conventional types, according to Dr. Thomas O. Paine, laboratory manager.

The new super-strong magnet is made by precisely controlling the size and shape of individual iron particles so small that there are more than a billion in a pound.

Saves Vital Metals

"The development opens whole new vistas to the design engineer because the iron particles can be imbedded in plastics, metal, rubber or glass," Dr. Paine said. The magnets are easily machined, drilled, tapped, soldered, and molded precisely into any shape desired.

In the offing are electric instruments that are smaller, lighter, more accurate and more rugged. General Electric engineers predict improved photographic exposure meters, aircraft instruments and other products using permanent magnets. However, it will be some time before the new iron-dust magnets are commercially available.

Another benefit seen in the widespread use of such magnets is the conservation of nickel and cobalt, heavily used in making most magnets today. And elimination of cobalt makes possible the application of magnets in nuclear reactors where material contain-

ing cobalt cannot be used because of high induced radioactivity.

Dr. Paine and his research team began the project several years ago armed only with the theory that ultra-fine elongated particles of iron might have a high resistance to demagnetization. But because iron particles tend to grow round, it took many months of experimenting to produce a few particles with significant elongations. The theory, apparently, has proved sound.



THE EYE of science is focused on a powerful new magnet made of iron dust. Owner of the eye is Dr. T. O. Paine, a General Electric researcher.

"The magnetic and mechanical properties of this material can be controlled precisely," Dr. Paine explains. "Not only can the qualities of available magnets be duplicated, but we can achieve characteristics previously unattainable."

The particles of iron dust used are so fine they can be seen only under the most powerful microscopes.

OPENHEARTHS: Industry Likes Them Bigger

There are fewer openhearts in the U. S. now than 10 years ago, but steel capacity is up 33 pct . . . Producers find economies in larger heat sizes . . . Operating techniques are changing—By G. J. McManus.

♦ TREND TOWARD bigger openhearts was pointed up recently when Weirton Steel Co. began operating its 600-ton (biggest ever) furnace.

Built by Loftus Engineering Corp., Pittsburgh, the new openhearth measures 111 ft long by 30 ft wide. It has a bath depth of 46 inches, will turn out in one heat enough steel for 3900 refrigerators.

This tops the 550 ton heats of two older Weirton furnaces and is well above the heat size of other

mill. But while other producers work with smaller heats than Weirton, nearly all have joined the move toward bigger openhearts.

A study by American Iron & Steel Institute shows that the United States has 911 openhearts, capable of producing 112.3 million tons a year. In 1945 there were more furnaces—990—but capacity was only 84.1 million tons.

To a great extent the increased productivity indicated by these

figures is due to larger heat size. In 1947, there were only 30 furnaces capable of turning out heats bigger than 225 tons. Today there are more than 204 openhearts with this capacity. Over the same period the number of smaller furnaces—under 100 tons—has declined from 39 to five.

New openhearts account for part of the swing toward larger heats. In the late thirties, furnaces were being built to turn out around 200 tons a heat. In the wave of construction of the early fifties, furnaces were built with ratings of about 275 tons per heat and many wound up producing 50 to 75 tons more than nominal capacities.

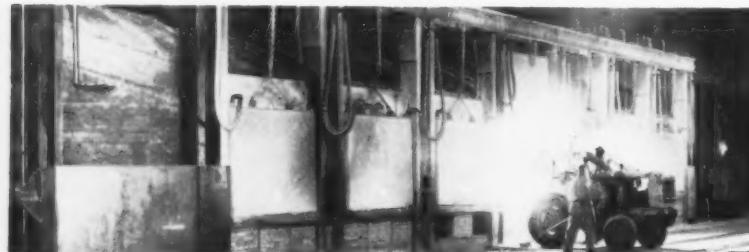
Current thinking seems to be in the direction of 400 ton heats. Koppers Co., Pittsburgh, is building seven openhearts for Bethlehem at Sparrows Point. These are rated at 350 tons per heat but steelmen are betting they will end up crowding 400 tons.

In addition to new construction, there have been extensive changes in the makeup and operation of existing openhearts. These have included enlarging hearth area, deepening the bath and increasing the charge. At Bethlehem a furnace that was built in 1951 with a rated capacity of 185 tons per heat is now turning out 380 tons. Most major mills have made similar increases in a limited number of large furnaces. Generally, this involves selective charging or generous use of blown metal.

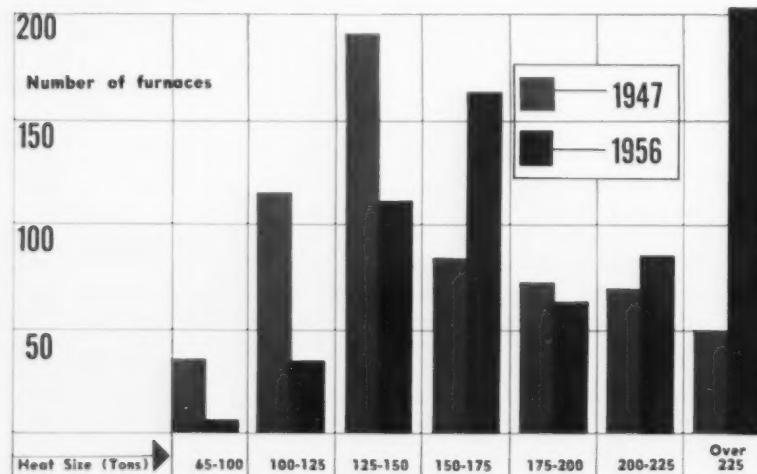
New techniques enable operators to deviate from conventional hearth area and bath depth figures without extending heat time excessively.

Other aids include larger furnace doors, better draft systems and use of oxygen.

The Trend to Bigger Openhearts

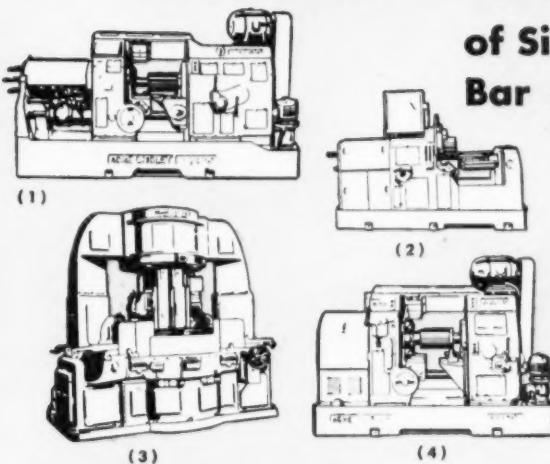


WEIRTON STEEL'S new, world's largest openhearth (above) will yield enough steel to manufacture 300 automobiles, 3900 refrigerators, 600 small tractors or 300 deep freezers in one 600-ton heat.



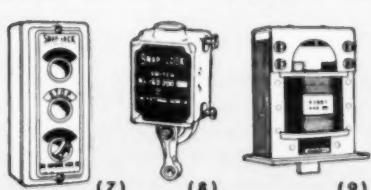
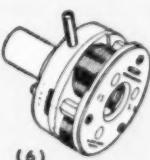
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Other National Acme "Firsts" include pioneering circular cutter threading tools to enable mass production thread cutting, introducing self-opening thread rolling heads, and building heavy-duty switches, solenoids and other electrical components—"Built As A Machine Tool Builder Would Build Them".

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EXPANSION IN INDUSTRY

International:

India, Japan get steel loans.

Israel builds openhearts.

Steel expansion throughout the world is getting impetus from World Bank loans to Japan and India. And in Israel, the first of two openhearts furnaces has gone into production at Acre, in Upper Galilee.

The World Bank loan to Japan totals \$20 million and will finance part of the cost of constructing a strip mill at Kawasaki Steel Corp.'s plant near Tokyo. Planned are semi-continuous hot and cold strip mills, soaking pits, iron ore pelletizing equipment, and service facilities.

Total cost of the expansion is estimated at \$48.8 million. When the new mill is completed in 1959,

Kawasaki is expected to rank as one of the most modern and efficient steel producers in Japan.

The Indian Iron and Steel Co., Ltd., at Burnpur, West Bengal, will also get a \$20 million World Bank loan. It will help finance additional rolling capacity so that IISCO will be able to increase its output to 800,000 tons of semi-finished and finished steel annually.

The Bank has now lent a total equivalent to \$126.5 million to increase iron and steel production in India.

In Israel, the Koor Co., a subsidiary of the Israel Labour Foundation, placed the first of two 40-ton openhearts into operation. It is hailed as an important step in Israel's struggle for economic independence.

The billets produced will go

into an adjacent rolling mill which has been working for some time. The furnace is being charged mainly with local scrap, with the addition of some imported pig iron.

Better Ore Handling

The Pennsylvania Railroad announced it will spend \$1 million to streamline transportation operations supporting its ore unloading facilities on the Delaware River at Greenwich Point. The improvements anticipate a steady increase in foreign ore tonnage through the Port of Philadelphia.

Work will involve laying or relocating more than four miles of track in South Philadelphia marshalling yards, construction of a car repair shop, and the laying of six repair tracks capable of handling 125 cars.

An ore pier, placed in service in 1954, is capable of unloading 6000 tons per hour.

Big First Step

Kelsey-Hayes Co. has announced an expansion of its Speco Aviation Div. facilities at Springfield, O. The plant will manufacture parts for the aircraft industry and will employ 200 to 300 personnel.

The 80,000 sq ft building will be erected in the Mad River Industrial Development near Springfield.

Meets Demand

Expenditure of \$900,000 for new machines, tools and related equipment is included in a \$1.5 million expansion program of the McGill Mfg. Co.'s bearing division.

Expansion of the Valpariso, Ind., company is designed to meet increased demand for bearings for the machine tool industry, hydraulic pump manufacturers and other industries.

New Package Power Reactor Almost Ready

BULLSEYE dropping this 31,600 lb reactor vessel into its vapor container meant lifting it 60 ft in air and lowering it through an opening with less than one inch clearance. The 2000 kw pressurized-water nuclear generating plant at Fort Belvoir, Va., will begin operations early 1957.



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- Your choice of five crawler mountings *plus* Transit Crane on rubber-tired carrier.
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Designed to out-perform

- Easy, air control for smooth, big-output working cycles.
- Easy to service—automatic lubrication of many parts.
- Large, cool-running clutches and brakes.

Built to outlast

- Six conical hook rollers distribute loads evenly between upper and lower works to save wear.
- Five main operating clutches are alike, with parts interchangeable.
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UNITED ENGINEERING & FOUNDRY CO., mounts roll necks on Timken tapered roller bearings, as in this typical application.

Another record! **TIMKEN® bearings on this plate mill have rolled 9 million tons of steel**

THIS 100" 4-stand continuous plate mill—built by United Engineering—went into service at U. S. Steel's Homestead Works in 1936. Some of the Timken® tapered roller bearings on work rolls and back-up rolls have now rolled 9 million tons of steel—all 31 Timken bearings in the mill have rolled an average 5 million tons.

One big reason for this record is the fact that Timken bearings practically eliminate friction. They're geometrically designed and precision-made for true rolling motion. Timken bearings offer low frictional resistance. Higher rolling speeds are possible. Acceleration is easier. There's less skidding and scuffing between rolls. Less repair and maintenance.

By holding rolls rigid, Timken bearings help insure "on-gauge" operation, reduce scrap loss. And by

holding shafts and housings concentric, Timken bearings make closures more effective, reduce lubricant leakage. Cut lubricant cost. Grease-lubricated Timken bearings require no tubes, pipes or reservoirs—cut lubrication system maintenance. No extra thrust devices are needed—the tapered construction of Timken bearings lets them take radial and thrust loads. Chuck mountings are more compact. Mill design is simplified.

Tonnage records indicate that the long life of Timken bearings keeps bearing cost per ton of steel rolled to a minimum. And prolonged roll life is assured because Timken bearings provide maximum roll neck strength, less wear. Mills using balanced proportion Timken roll neck bearings increase roll neck strength up to 60%—load ratings up to 40%. The balanced proportion design per-

mits large diameter roll necks without increasing bearing O.D.—maximum capacity in less space.

For lowest cost per ton of steel rolled, look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable: "TIMROSCO".



This symbol on a product means its bearings are the best.



TIMKEN

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REPORT TO MANAGEMENT

To Spend or Not To Spend

You might be surprised to know that the head of one of the largest corporations is in trouble with his biggest group of stockholders. Particularly so in view of a consistent record of setting records. This applies to both sales and profits.

The issue is not efficiency or product. The argument is over the company's current policy of spending heavily on capital improvements. The stockholders reportedly would like more dividends for their own purposes. They believe that dividends should be higher, dispute the plowing back of earnings into new plants and equipment.

But this isn't a story of one company and its internal problems. It's intended to point out what may be a universal issue in most large companies this year. The new tools of production come high these days. Most companies believe they need them. But large expenditures from earnings come at the expense of dividends in many cases.

Why Capital Spending Is Necessary

Executives who feel that they have to go ahead on heavy spending programs aren't always prompted by the same reason. In some industries, problems are different from others.

In the auto industry, on one side, modern plants and the latest machine tools are a must to keep manufacturing costs down. In this industry it's almost as much a battle of manufacturing costs and productivity as it is a battle of sales.

In some others, the problem is one of expansion to meet the clamor for more production. Here too, new, efficient capacity is almost too much for current earnings, good as they are. In other industries the problem varies, but it boils down to the same thing. It's a question of how much to spend, and where to spend it.

Has Expansion Reached Its Peak?

At the moment, there's little to indicate a cut-back in industry's expansion. It's true that expenditures for this purpose were less than planned in the third and fourth quarters of 1956.

And announced plans for early 1957 indicate a slight slowdown. But so far this slowdown is only in *rate* of increase. A survey by the Dept. of Commerce and the SEC shows nonfarm businesses are still planning to purchase new plants and equipment at an annual rate of \$38 billion. This compares with \$36 billion in the third quarter of 1956 and about \$37.3 billion in the final three months.

As the survey puts it, "The projected rise . . . is at a slower rate than the quarterly increases that occurred during 1956."

Actually, pressure from stockholders is something new in the picture. This "slow-down" is generally attributed to either difficulty in obtaining materials, aftermath of the steel strike, or, even more important, the high rate of interest. It costs more to finance capital expenditures when outside financing is needed.

It's Time To Evaluate

In most cases, it's believed that new equipment is absolutely necessary to compete in today's economy. This is in spite of all the Federal Reserve Board's attempts to slow down excessive spending—particularly if it has to come from borrowed funds.

There's no reason to believe that the capital spending boom is at an end. Repeating, it's only the rate of climb that's leveled off. But there's no point in ignoring new developments. Chances are, your company is also one that's feeling the squeeze on dividends.

INDUSTRIAL BRIEFS

Changing Channels . . . The General Electric Co. will convert its Buffalo, N. Y., TV picture tube plant to the manufacture of transistors early in 1957. The company now produces transistors at Electronics Park, New York. G.E. estimates the industry will be producing about 480 million transistors by 1965, four thousand pct more than in 1956.

Turn up the Thermostat . . . A modern \$2 million manufacturing plant has been opened in Milford, Conn., by the Bridgeport Thermostat Div. of Robertshaw-Fulton Controls Co. Complex precision instruments and components for industry and jet aircraft are being produced.

Refined Gentlemen . . . U. S. Pipe and Foundry Co., Birmingham, Ala., has been assigned the patent for a process of refining low-grade brown iron ores or "limonites." The method was developed by Richard E. Perry, research chemist for the U. S. Bureau of Mines at the University of Alabama. The process calls for use of a special machine and waste materials of paper pulp mills.

Strip Show . . . Combined sales offices and warehouse facilities for selling and servicing steel strip and accessories have been established in Charlotte, N. C. and Atlanta, Ga., by Brevard Steel Div., Sharon Steel Corp.

Sharp Shapes . . . A carbide metals shop has been opened in Kenilworth, N. J., by General Electric's Metallurgical Products Dept. The facility is geared to process small quantities of especially-shaped cemented carbide tools. It includes equipment for forming semi-standard and special-shape cemented carbide blanks ranging from one to 75 pieces, for delivery in 4 to 6 days.

Down East To Down South . . . The Fram Corp., Providence, R. I., has taken over a plant at Birmingham, Ala., formerly occupied by United Specialties of Alabama. Fram has a purchase-option arrangement covering the building, machinery, and equipment. Factory will be a branch plant for the manufacture of carburetor air cleaners and silencers for the automotive industry, and other metal stampings.

Middle Of The Foundry . . . Pennsylvania State University will conduct a foundry conference June 20-22, 1957. A number of chapters of the American Foundrymen's Society and independent foundrymen's groups will co-sponsor the event. It will be aimed at the middle men in foundries, foremen and supervisors, who work directly with sand and metal. Discussions will be held on steel, gray iron, malleable iron, non-ferrous, sand, and mechanization.

Double Feature . . . Two 20-minute, 35 mm colored sound slide films showing how to install and properly maintain electric motors are now available from Allis-Chalmers. "How to Make a Motor Go, and Go, and Go, and Go," covering maintenance, and "How to Take Step Seven," dealing with proper installation, depict by means of cartoon characters and illustrations how motors can be kept in good operating condition.

Power In The Pacific . . . A 156,250 kw turbine-generator — largest type ever exported by Westinghouse — has been sold in Japan to the Kansai Electric Power Co., Inc., for installation in its new power plant at Osaka. Valued at \$5.5 million, it will be installed with a similar unit ordered for the Osaka station earlier this year. Together, the generators will add two billion kilowatt hours annually.

Filter Tip? . . . The American Foundrymen's Society, Des Plaines, Ill., has published an Air Pollution Manual. The book provides foundry management with up-to-date information on how to evaluate an air pollution situation, engineer its control and maintenance, and select equipment and materials on the basis of local atmospheric and related conditions.

Rolling up the Score . . . Hoover Ball and Bearing Co., Ann Arbor, Mich., has acquired all assets of Gerity-Michigan Corp., Adrian, Mich. The transaction involved the exchange of 7½ shares of Gerity common stock for one share of Hoover.

Silver Threads . . . The American Society of Tool Engineers' Silver Anniversary technical meeting and convention will be held March 23-28, 1957. It is scheduled at the Shamrock Hilton Hotel in Houston, Tex. and will include symposiums on ceramic and plastic tooling, technical papers, panels.

Pressing Out . . . The Standard Pressed Steel Co., Jenkintown, Pa., is making a \$1.4 million addition to its Hallowell Steel Shop Equipment Division. SPS is a major maker of precision threaded fasteners and producers of steel workbenches, cabinets, shelving and storage walls.

Growing Like Mad . . . Kelsey-Hayes Co. is planning to expand its Speco Aviation Div. plant in the Mad River Industrial Development, near Springfield, O. The company will build an 80,000 sq ft factory on a 68-acre tract. It's the first step in the development of this location for Speco Div. activities in the Springfield area. The plant is expected to employ between 200 and 300 workers.

World's tallest pile driver...
World's toughest test rig...
for
Elastic Stop® nuts



Each hammer-stroke of this 270-foot pile driver delivers a 24-foot-ton wallop! It was built by Raymond Concrete Pile Company to drive 200-foot pipe piles for the foundation of units being added to the B. C. Cobb Steam Plant of Consumers Power Company, at Muskegon, Mich.

Raymond makes a practice of using Elastic Stop® nuts for bolting together sections of leads and booms on all their pile-driving equipment. The red elastic locking collar of these vibration-proof fasteners has successfully maintained its grip under these severest of all vibration and impact conditions!

Whether used on aircraft or locomotives; guided missiles or steam shovels . . . more than twenty years of field testing on applications where safety and severe operating conditions demand a fastener that will not shake loose, prove that . . . *you can rely on Elastic Stop nuts.*

**ELASTIC STOP NUT CORPORATION
OF AMERICA**

Dept. N77-115, 2330 Vauxhall Road Union, New Jersey

The red locking insert in an
Elastic Stop nut guarantees

- **reusability**
- **vibration-proof locking**
- **thread sealing . . . no galling**
- **immediate identification**
- **adaptability to all shapes and sizes of threaded fittings**
- **suitability to production line assembly methods**





AUTOMOTIVE ASSEMBLY LINE

What Industry Is Doing About 'Lemons'

The occasional faulty car that gets through factory inspection is a problem to automakers . . . Incidence is higher in retooling years, but automation offers a solution . . . Warranties effective—By T. L. Carry.

◆ A vexed letter writer is taking this column to task for ignoring "poor workmanship and sloppy assembly in so many of the late model cars."

He points out that there is currently much ballyhoo about safety and styling features in 1957 cars.

"While these are important," he concedes, "equally important is the matter of building cars for more economical maintenance."

"Far too many car owners have had the aggravating experience of repeated expense in having factory built defects repaired, mainly because some of the car makers did not and still do not see fit to build a little more quality into their cars."

Cancer, or Just Colic? . . .
"Checking with many auto me-

chanics and dealers brought out the harsh facts that shoddy workmanship, sloppy assembly methods, and lack of adequate assembly inspection are on the increase. Most in agreement are the many people who own late model cars literally slapped together by the well-known 'quick and dirty' method. Why is all this overlooked by the press?"

This is the first time that I have ever been accused of sticking my head in the sand and ignoring what the letter writer refers to as a "growing cancer of the auto industry."

Actually, it is impossible today to buy a poorly engineered car. No matter what make, model or price class you consider, all cars are pretty well engineered.

This is not to say that it is not

possible to get a lemon. It certainly is and it sounds as though the author of the letter bought one.

Retooling Brings Headaches . . .
There are many things about today's automobiles that are not exactly desirable. For example, spark plugs on a modern V-8 engine are almost inaccessible.

An automobile has always been a series of compromises. Usually, when a desirable item is added, it creates engineering problems in other parts of the car. The result is that changes have to be made. In most cases, it is impossible to have your cake and eat it too.

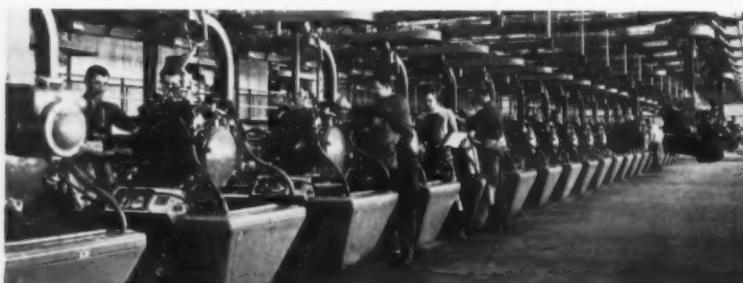
Also, keep in mind that there were a great many changes made on the 1957 cars. Even if it doesn't look like much of a change, there were literally hundreds of new dies and tools ordered for the new models. This created production problems and it's possible that a few cars got through inspection that should not have.

Automakers are aware of these things and are constantly striving to do something about it.

The Warranty Cure . . . You will find that as assembly methods become more and more automated, the problem of lemons will also decrease because automatic assembly eliminates to a great extent faulty parts.

The industry has more than a satisfied customer on its mind this year. There is also the added incentive of warranties.

This is the first year that the factory is assuming 100 pct of the cost of the warranty on a new

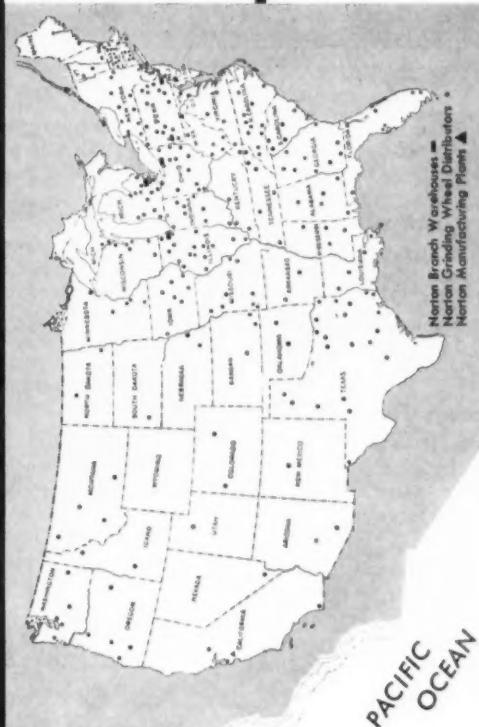


Does Mass Production Mean Sloppy Work?

Modern assembly operations such as this engine line, turn out autos fast and at minimum cost. But there is feeling that too often quality is sacrificed in the process. During model changeover years, especially, defects seem to crop up. A small percentage of mechanical failures are inevitable, automakers admit, and they are hoping that the percentage will be reduced through use of more automatic equipment. And for the first time, some factories are assuming 100 pct of the warranties on their new cars. It is putting more pressure on inspection points along the assembly line.

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Norton makes a really complete line of grinding wheels to save you time and money across the widest range of grinding jobs . . . adding the same profit-boosting "Touch of Gold" to your general purpose grinding as to your production jobs. Norton wheels are made in every abrasive-and-bond combination you need, including the new, revolutionary 44 ALUNDUM® abrasive that's tops among all non-premium priced aluminum oxide abrasives.

Get These Facts and Prices

The new catalog *Norton Grinding Wheels*, Form 1052, brings you a lot of general purpose information and describes wheel specifications that will bring you best results. Every item in this catalog is available from stock. Included is a new supplement showing net prices. Get one from your Norton Distributor. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, Yellow Pages. Behr-Manning Company, Troy, N. Y., division of Norton Company, Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts. For the booklet or other information write to Norton Company, Worcester 6, Mass.

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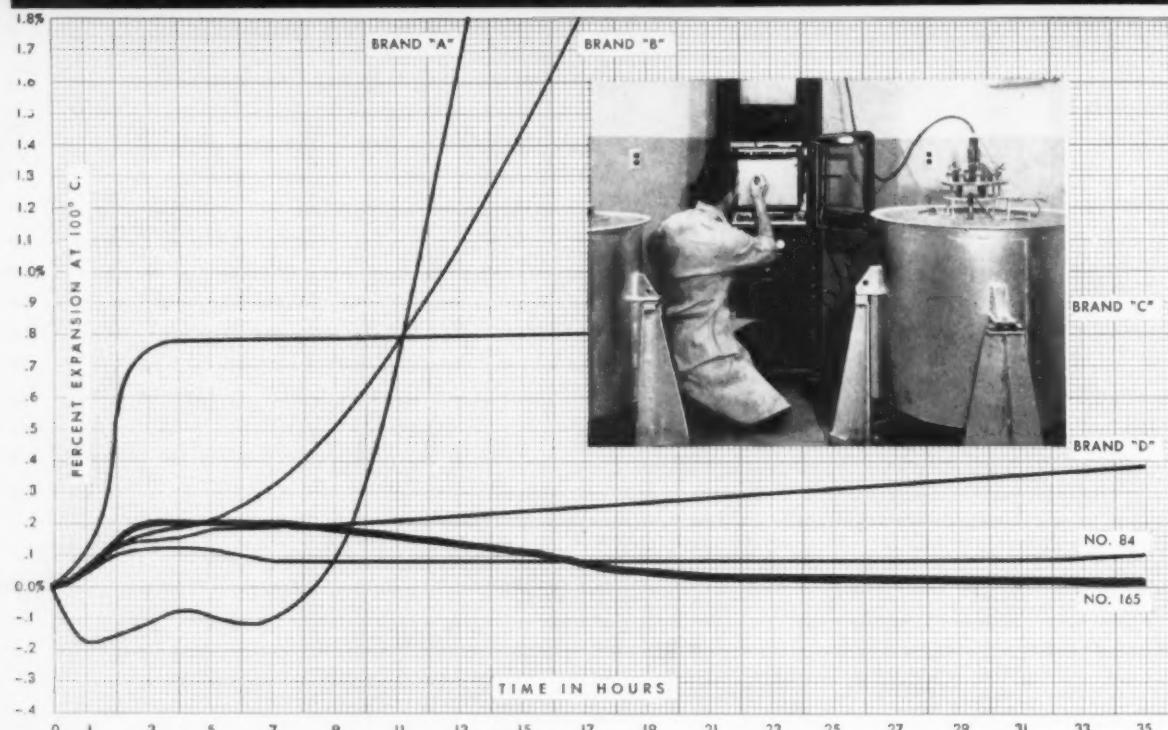
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Making better products . . . to make your products better

DILATOMETER VOLUME STABILITY TEST

**"SOAK AND SWELL" CHART shows why Permanente
165 Ramming Mix gives longest-life furnace bottoms**



HYDRATION—reaction with water—during the heat-up period usually causes swelling of rammed magnesia bottoms. Leading ceramic engineers believe that as little as 0.3% expansion indicates damaging hydration, shorter bottom life.

To measure these minute expansions, Kaiser Chemicals Research developed the sensitive electronic instrument shown above. This device, called a dilatometer, can accurately measure and record expansions of less than 0.01% and maintain a constant temperature within $\pm 0.5^\circ\text{C}$.

Dilatometer Traces Charts

For the test charted above, equal size blocks freshly prepared from each of six well-known ramming mixes were placed in a common heating chamber and attached to the recorder.

The chamber was then heated to just below the boiling point of water with the atmosphere held at 100% relative humidity to create forced hydration conditions. Finally, the samples were allowed to soak for 35 hours to simulate hydration conditions which a mix may encounter in the deeper regions of a bottom.

As you can see in the chart, Permanente 165 shows virtually no signs of expansion... proof that

it resists hydration significantly better than any other ramming mix tested. (Permanente 84 Hot Patching Mix runs a very close second.)

Research Aids Bottom Performance

Permanente 165's outstanding resistance to hydration is an excellent example of how Kaiser Chemicals Research is working to give you furnace bottoms that last longer, need fewer repairs. Why not let your Kaiser Chemicals Sales Engineer provide research, design and installation assistance to help you take advantage of this superior ramming mix?

Call or write Kaiser Chemicals Division, Dept. R7122, Kaiser Aluminum & Chemical Sales, Inc., at any of the addresses listed below:

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Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
JAN. 5, 1957	96,311	11,648
DEC. 29, 1956	105,705	13,571
JAN. 7, 1956	129,371	20,015
DEC. 31, 1955	108,356	13,762
TO DATE 1957	96,311	11,648
TO DATE 1956	129,371	20,015

*Estimated. Source: *Ward's Reports*

car. You can bet that no producer in the business is going to cost himself any more money than he has to. He will see to it that the cars are right before they get to the dealer.

This business of underwriting warranties, incidentally, is probably one of the main reasons that there was a shortage of cars just after the 1957 models were introduced.

Two Pontiac Engines

Pontiac Motor Div. is now offering two new engine options for its customers. Both engines use the three 2-barrel carburetor system which was first introduced on the new Oldsmobile.

One develops 290 hp with Hydra-Matic transmission. The other, primarily for stock car enthusiasts, is rated at 317 hp.

The race engine is available with either a standard or automatic transmission. In addition to three carburetors, the increased hp is obtained by timing the cam-shaft so that intake and exhaust valves stay open longer to improve engine breathing.

Sales:

Ford is expected to gain ground on Chevrolet.

Chevrolet is still the nation's top producer of automobiles.

Edward N. Cole, general manager of the GM division, says that Chevy outbuilt competitors by at least 300,000 units in 1956.

The margin was more than three times as great as 1955, according to Mr. Cole.

Mr. Cole estimates that Chevrolet produced 1,621,720 cars and 353,401 trucks in the U. S. last

year. He adds that the company is in top shape to meet the problems of 1957.

Opinion in Detroit is that Chevrolet better be in top shape this year. Although it is still generally conceded that Chevy can outsell Ford in 1957, it is also pretty well accepted that the margin isn't going to be even half as great as it was last year.

Ford has a good product this year. It's stylish and performs well. The Ford Div. has been working overtime practically since the new models were introduced to keep up with dealer demand.

It's going to be a hot race this year and whichever company comes out on top probably won't have a margin much over 20,000 cars.

SAE Weighs the Atom

The Society of Automotive Engineers will hold its regular annual meeting in Detroit next week.

Among the many papers to be presented at the session is one on the Atom and the SAE. It will deal with promising applications of nuclear energy in the industry. The by-products of nuclear energy such as heat-resistant metals will

THE BULL OF THE WOODS

AUTOMOTIVE NEWS

also be explored in detail.

The engineers will consider various fuel injection systems. Also on the agenda is a session on the design features of the new Cadillac and Chrysler.

Another interesting session is planned on cast and forged crankshafts. The body activity group may come up with some interesting observations on the relative merits of unit bodies and standard frames in automobiles.

Bump-Free Ride

Use of continuously reinforced concrete pavement may be the key to providing bump-free rides.

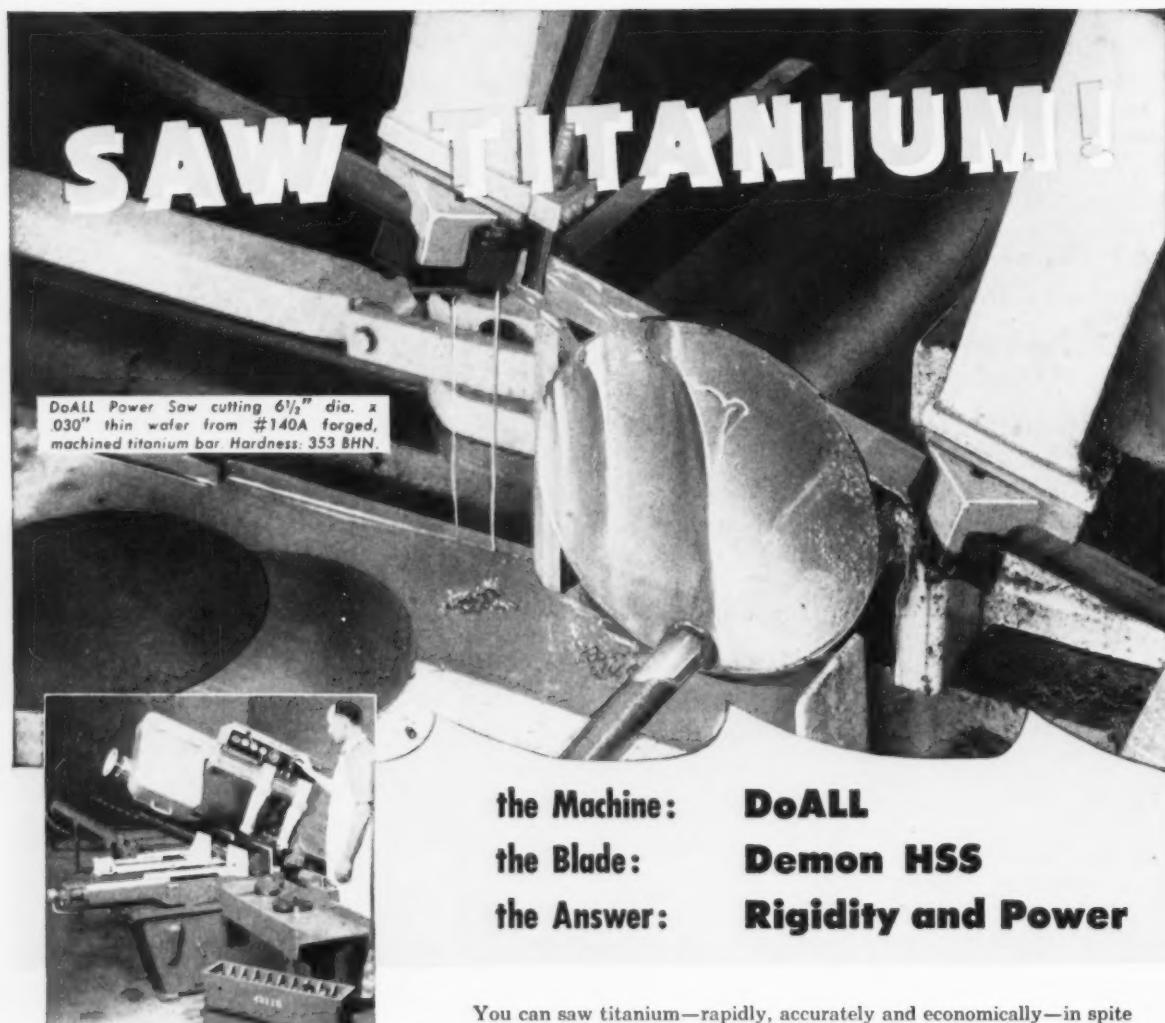
Indiana, Illinois, New Jersey, California and Texas already have stretches of concrete highway constructed in this manner.

The Committee on Reinforced Concrete Research of AISI is also helping sponsor research on Pennsylvania highways.

Some authorities believe this type of pavement will outlive conventional construction by a few years.

By J. R. Williams





DoALL Power Saw cutting $6\frac{1}{2}$ " dia. x 030" thin waler from #140A forged, machined titanium bar. Hardness: 353 BHN.

the Machine: DoALL
the Blade: Demon HSS
the Answer: Rigidity and Power

You can saw titanium—rapidly, accurately and economically—in spite of its extreme toughness and many inconsistencies.

It takes a rigid, powerful saw. The versatile, new DoALL Power Saws and Contour-matic band machines transmit positive controllable power, through infinitely variable speed drive and constant automatic, hydraulic power feed. Frames are rigid, rugged... built to deliver fast, accurate cuts for every bit of power consumed.

It takes High Speed Saw Bands. DoALL Demon HSS Saw Bands have proven best for sawing titanium and other tough-to-cut alloys. They're built to retain their tooth hardness at temperatures up to 1100°F which means that they can be run much faster and thereby cut faster.

It takes Know-How. DoALL can help here, too. Submit a sawing sample and state your problem. DoALL customer research laboratory will conduct sawing tests with standard machines under shop conditions. Detailed report will provide recommendations on machine, speed, feed, saw type, coolant, production rate, tool life, etc. Call your local DoALL Sales-Service Store for details or write:



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The DoALL Contour-matic machines a greater variety of materials more efficiently than any other machine tool.

FBM-36



LOCAL SERVICE—38 DoALL Sales-Service Stores provide prompt, competent attention to your sawing needs through factory trained personnel.



THIS WEEK IN WASHINGTON

Small Business Gets Bipartisan Pat

Probable tax aid for small business is in sight . . . Support from both parties indicates cut in business income under \$25,000 . . . Other tax cuts for business are unlikely in 1957—By G. H. Baker.

♦ THE EISENHOWER Administration is trying hard to discourage Congress from voting any across-the-board tax cuts this year. But there's a reasonably good chance that the White House and congressional leaders will work out a deal for lowering the tax rates applying only to the income of small corporations.

Both political parties are eager to offer smaller firms a reduction in rates. The bipartisan support that is now taking shape in the Senate and the House for such a reduction indicates a good political climate for voting some helpful reductions for the "little fellows" in business and industry.

What's Likely . . . Here are the main points in one of the most-talked-about plans:

Reduce the rate on the first \$25,000 of income from 30 pct to 20 pct.

Increase from 22 pct to 32 pct the existing surtax on all income over \$25,000.

Thus firms with annual profits under \$25,000 will be able to gain a reduction in 10 percentage points in their base rate. While this is only "peanuts" to the majority of incorporated firms, it will be a helpful stimulant to the thousands of old and new smaller firms that are struggling.

Social Security Up

Five million employers in American industry and trade will get a delayed jolt from the higher social security taxes that took effect Jan. 1.

Tax rate for workers now is up

to 2 1/4 pct of the first \$4,200 of annual earnings, compared to the former 2 pct. This change pushes the maximum tax up \$94.50 a year, which must be matched by the employer.

First effects of this \$10.50-a-year hike will be felt in April, because the tax is paid quarterly. The new revenue, expected to total \$721 million annually, is to go into a special fund separate from the regular social security reserve. It is to be used only for payments under the new disability insurance program voted by Congress.

Self-employed persons also are subject to an increased social security levy now. Rate for this group, formerly 3 pct, has advanced to 3 1/2 pct of the first \$4,200 earned each year. Because this amount can be paid annually, the self-employed can pay when

they file their 1957 tax returns.

Revenues for the regular Old-Age and Survivors Insurance (OASI) trust fund in this calendar year are estimated at \$7.259 billion. When the \$721 million for disability insurance is added to this amount, the total for all federal social security taxes in 1957 reaches nearly \$8 billion.

Atomic Power Cheap

Atom power for its ships is worth the high price, the Navy figures. Submarines driven by nuclear engines now are the standard undersea types. And this year Congress will be urged to vote for a huge, atom-propelled carrier, to cost more than \$300 million. Early cost estimates ran up to \$400 million. It will out-displace the 60,000-ton Forrestal by 25,000 tons.

How're Chances of Cutting Paperwork?

- **Another try at reducing the volume of reports made to the government by businessmen is scheduled this year.**
- **Plan is to ask Congress to approve combining social security and income tax reports filed by employers on employee earnings. This was also proposed to previous Congress, with no action.**
- **Treasury Dept. and Dept. of Health and Welfare worked out the consolidating plan. It calls for dropping of some 12 million detailed quarterly plans filed by employers for social security records. Wage data needed would be taken from withholding tax statements.**
- **Administration of social security taxes would be improved under the revised system. In the Bureau of Old Age and Survivors Insurance, the Forms W-2 would be mechanically matched with copies wage earners attach to their tax returns.**

"Stress raisers" eliminated by Link-Belt LXS chain design

LXS "FULL-ROUND" DESIGN



"FULL-ROUND" DESIGN eliminates stress concentration points. Heat treatment of all parts adds even greater strength and extra wear life to selected steels. Accurate control of these processes avoids brittleness, poor wear values and low tensile strengths . . . and assures uniformity.

Large pins, bushings mean ample live bearing area for long life

For long life under severe conveyor and drive conditions, Link-Belt LXS chain provides extra strength, increased wear resistance and wider application flexibility. This fabricated steel roller chain incorporates many advanced design and manufacturing refinements, resulting in superior ruggedness and accuracy.

Eliminate weak points

"Full-round" design does away with stress concentration points most frequently subject to failure . . . provides maximum live bearing area between pin, bushing and sidebars. As a result, stress is distributed evenly, increasing chain life.

Pins and bushings are accurately sized for controlled press fit, preventing rotation in sidebars. Made from selected bar steel, sidebars are

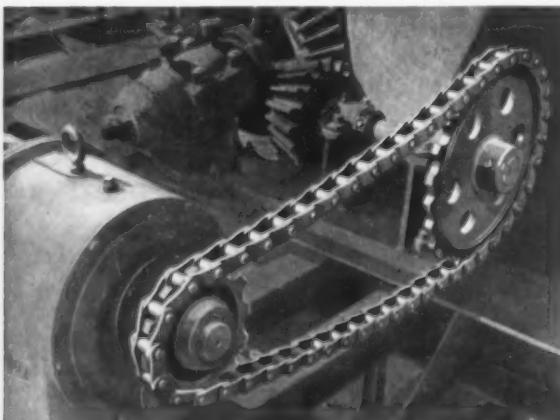
carefully machined for proper pitch hole size and for maintaining firm, tight press fit of pins and bushings. This assures close control of pitch and proper chain length after assembly.

Hardening extends life

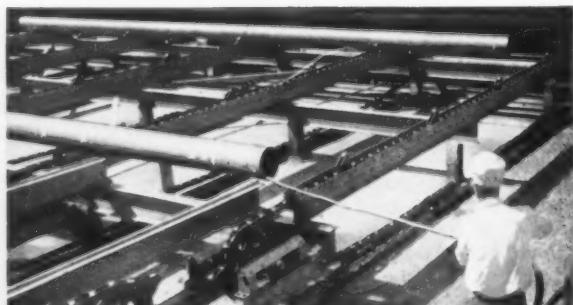
Another Link-Belt long-life extra is the controlled hardening of selected steels used in the manufacture of LXS chain. Pins, for example, are made from a tough steel, specially treated for high strength in shear and for maximum wear value. Bushings are properly hardened to shrug off shock and resist wear.

Rollers are accurately machined to assure proper operating clearances and free-rolling action. Controlled hardening gives them the necessary resiliency and durability.

LXS especially popular for exposed drives, high impacts



Link-Belt LXS chain is the long-life answer for exposed drives, abrasive and high-impact conditions. Its large, live bearing area reduces cutting action of abrasives because load is spread over a broad area.



LXS chain provides extra strength, wear-life for heavy-duty conveying

Link-Belt LXS chain has real stamina—as shown in this conveyor application for handling 1000-pound, 40-foot lengths of steel pipe. Thanks to accuracy of pitch and at-

achment spacing, plus close matching of multiple strands, LXS has the added strength and wear life for the extra-long conveyors so popular in today's move to mechanization.

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LINK-BELT



CHAINS AND SPROCKETS



Steel Expansion Moving Into High

Mills, keeping pace with area's booming growth, push expansion plans to the limit . . . Bethlehem Pacific, Columbia-Geneva and Kaiser Steel all increase capacity . . . "Imports" still heavy—By R. R. Kay.

◆ WEST COAST steel mills are hitting a blistering pace. It's a good bet they'll go at capacity rates—and maybe more—right through 1957.

And while doing it, they'll push like mad to finish up current expansion projects, get new ones launched, and sharpen up production methods and equipment to squeeze out every possible ton.

Prolonged Gallop . . . This feverish-paced activity is a must if the mills are to keep up with the area's booming growth. However, the basic picture won't change this year, or for some years to come. Demand for steel will run well ahead of the supply. During 1957 some 2 million tons of manufactured or fabricated steel products will again have to be "imported."

That's the outlook from an IRON AGE survey of top executives at the West Coast's "big three": Bethlehem Pacific Coast Steel Corp., Columbia-Geneva Div. of U. S. Steel, and Kaiser Steel Corp.

Three Over 100 . . . Bethlehem's three steel plants—Los Angeles, San Francisco, and Seattle—are operating at over 100 pct of rated capacity, reports H. H. Fuller, Bethlehem Pacific president. He sees big demand from: increased highway building, spurred by start of large federal spending in the Far-west; continuing pipeline construction; municipal, state, and federal building projects; construction of industrial and office buildings; and a return to high-level home-building activity.

"Prospects for new ship con-

struction on the West Coast during 1957 are excellent. The steady increase in new industries here will call for much greater tonnages, especially in flat rolled products," Mr. Fuller predicts.

Seattle Saga . . . Latest Bethlehem expansion plan: a three-year \$25 million Seattle investment. It will up that plant's capacity 174,000 tons—a 70 pct hike—and raise the company's total West Coast tonnage to 1.175 million per year. Work is already underway in Seattle on two 100-ton capacity electric furnaces and new rolling mill facilities. The present five open hearth furnaces will be dismantled.

Goal in Sight . . . Columbia-Geneva is fast reaching its goal of 2,260 million tons per year at

the Geneva Works, Provo, Utah. Work began early last year to raise production from 1,879 million tons. Part of the new capacity is already in production.

At the Pittsburg plant (San Francisco Bay Area), workers are at work installing a third high-speed electrolytic tinning line. When running, it will boost output of this product to 440,000 tons per year—up 55 pct.

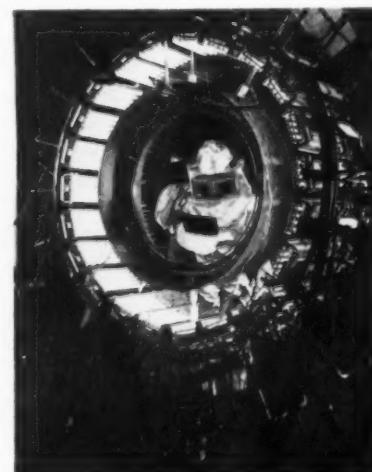
Lots of Zoom . . . Kaiser Steel's 1956 shipments hit new highs. And prospects for this year are excellent, says Jack L. Ashby, vice president and general manager. The firm's going full steam ahead on its \$113 million expansion. The aim: a 40 pct production increase at the Fontana (Calif.) Works. Major units in this expansion are scheduled for 1957 and 1958.

Nothing But Heat, Cold and Stress

◆ **PROBING THERMAL BARRIER** these engineers study triple-torture effects of simultaneously heating and cooling a metal ring simulating a portion of an aircraft's fuselage during stress.

The work—in the Structures Test Laboratory of North American Aviation at Los Angeles—is part of firm's research into aircraft heat problems.

During the testing, ring is heated to about 450° F by battery of infra-red lamps that encircle it, while inside is cooled to 90° by cold air blown through tubes. At same time, hydraulic devices pull metal to simulate stresses.



How Can Any Hack Saw Cut As Fast As a MARVEL?



**MORE CUTTING STROKES
PER MINUTE**

MARVEL Reciprocating Crank Lever Action, providing quick return of the saw frame on the non-cutting stroke produces 33½% more cutting strokes per minute than ordinary saws *without increasing the peak blade velocity on the cutting stroke*. Result: faster cutting-off without damage to the blade.

With far greater feed pressures automatically available, plus more cutting strokes per minute, is it any wonder that MARVEL Series 6 and 9 Hack Saws will give you faster, accurate cutting-off every time?

**GREATER EFFECTIVE
FEED PRESSURE**

MARVEL Series 6, 6A, 9 and 9A Hack Saws are capable of automatically applying *more than twice the feed pressure* required for most hack sawing jobs. This means that MARVEL Saws can utilize the full strength and heat resistance of the modern composite hack saw blade which is designed to cut most efficiently under heavier feed pressures. MARVEL Dual Power Feed forces the blade to cut as deeply as possible and **practical** on every stroke—to cut-off the work in the fewest possible strokes by automatically adjusting the feed pressure in relation to the changing work resistance.

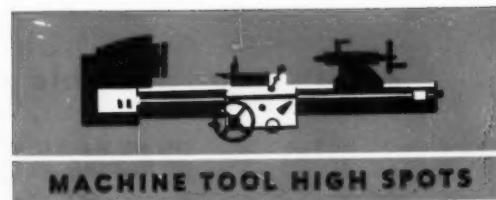
Write for the
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and the complete
story on MARVEL
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S-1301

MARVEL *Metal Cutting*
SAWS
Better Machines-Better Blades



Bigger Orders On Way For Builders

After two prosperous peacetime years, the machine tool industry is brimming with confidence . . . Continued growth seen as inevitable in some quarters . . . Population growth a vital factor—By E. J. Egan, Jr.

◆ APPARENTLY it's no longer fashionable to speak of the machine tool industry in "feast or famine" terms. Builders are dining right well on new orders these days. The specter of famine hasn't been hovering around since 'way back before the Korean crisis.

Prospects for both the near and long term look pretty good, too. Encouraged by the steady business gains they've enjoyed in the past two peacetime years, builders are now toying with the idea that what they're mixed up in is, after all, a growth industry.

With some builders this isn't just a feeling; it's a firm conviction. Others aren't quite so sure, but they see no harm in going along for the ride.

Reasons Sound Impressive . . . Where the beliefs are so very firm, just what are they based on?

Let's set it up this way. New machine tools will continue to be sold and bought in steadily increasing quantities because:

1. They're needed (along with other capital equipment items) to equip the approximately 400,000 new workers that move into the nation's industrial picture each year.

2. They're one of the best means the metalworking industry has for raising output per worker. And productivity must be boosted to offset constantly rising costs for raw materials and labor. Call this automation, if you wish. Whatever name you give it, it's here to stay and to grow.

3. New, tougher alloys and new tooling materials (such as ceramic

cutting tools) demand faster, more powerful machines for top production efficiency.

4. Considerable numbers of old machine tools just plain wear out each year and have to be replaced. Others become obsolete in the true sense that, although they're still usable, they're not as profitable to operate as a new model.

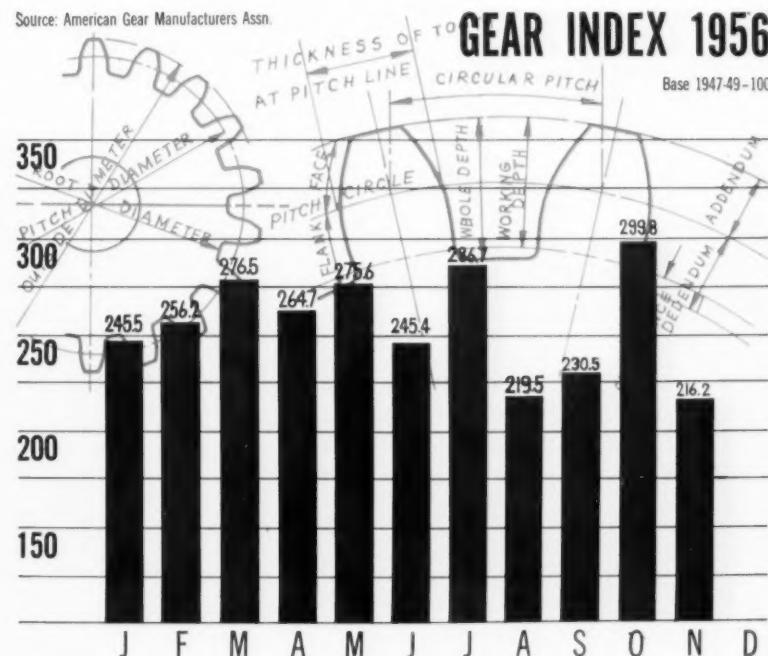
Re-equipment Pays Off . . . And this idea of periodic, planned replacement of machine tools for purely profit reasons is gaining ground. For example, 54 pct of 292 firms who recently replied to a Machinery & Allied Products Institute questionnaire said that they make special studies to check

the economic advantage of re-equipment. (See P. 26.)

5. The metalworking industry in general is loaded with big expansion plans. In a sense, the industry can't stop this, even if it wanted to. The urge to make something new, something better, something to raise the living standards of more people everywhere is just too strong. No one can deny that new machine tools will be needed to fashion these new products.

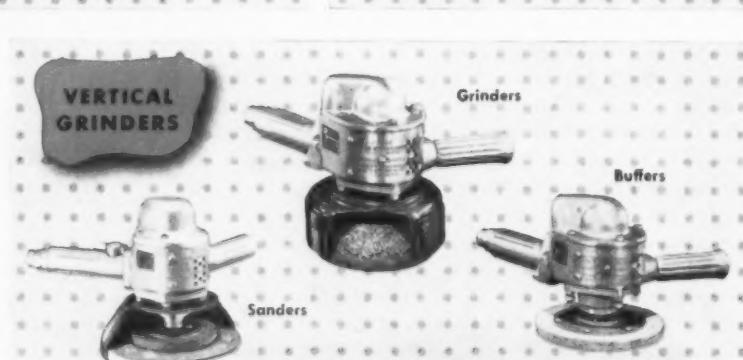
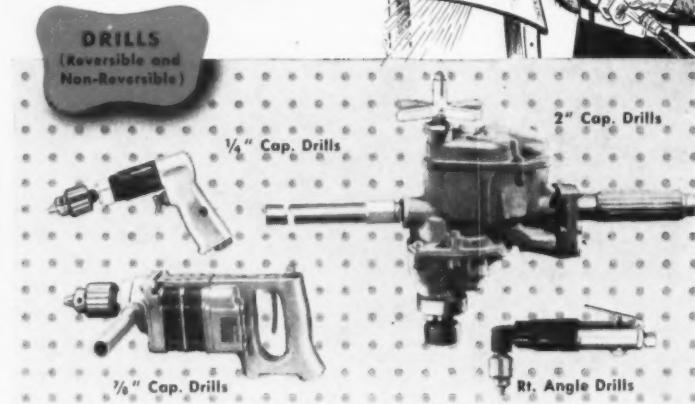
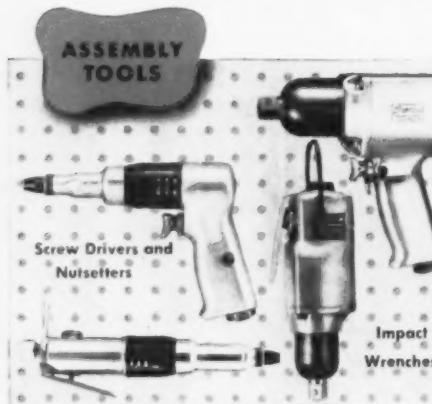
6. Government machine tool purchases will reach new peacetime highs. The super weapons needed to maintain strong national defense posture call for better metal fabricating machines and skills.

Source: American Gear Manufacturers Assn.



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UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



The Iron Age

SALUTES

Dr. J. H. Young

Retiring president of H. H. Robertson Co., his inventions during the past thirty years have stimulated the use of steel products in building construction. His career began as a college chemistry teacher.

A good share of credit for the tremendous increase in use of steel in building construction during the past 30 years goes to Dr. J. H. Young, retiring president of H. H. Robertson Co.

It's no secret that steel is the sturdiest and most economical construction material. But through Dr. Young's efforts, more uses were found for steel in this market, and he helped prove that steel can also be used to cover a building attractively, giving the architect more design freedom than ever before.

His inventions range from colored metal architectural paneling to roof ventilators. Perhaps his greatest contribution was the development of a Q-shaped cellular steel flooring.

Until 1932, when Dr. Young was granted his original patent for this invention, monolithic concrete was the traditional material for structural floors. But as buildings grew taller weight became an important consideration.

And increasing use of business machines required more flexibility in location of electrical outlets.

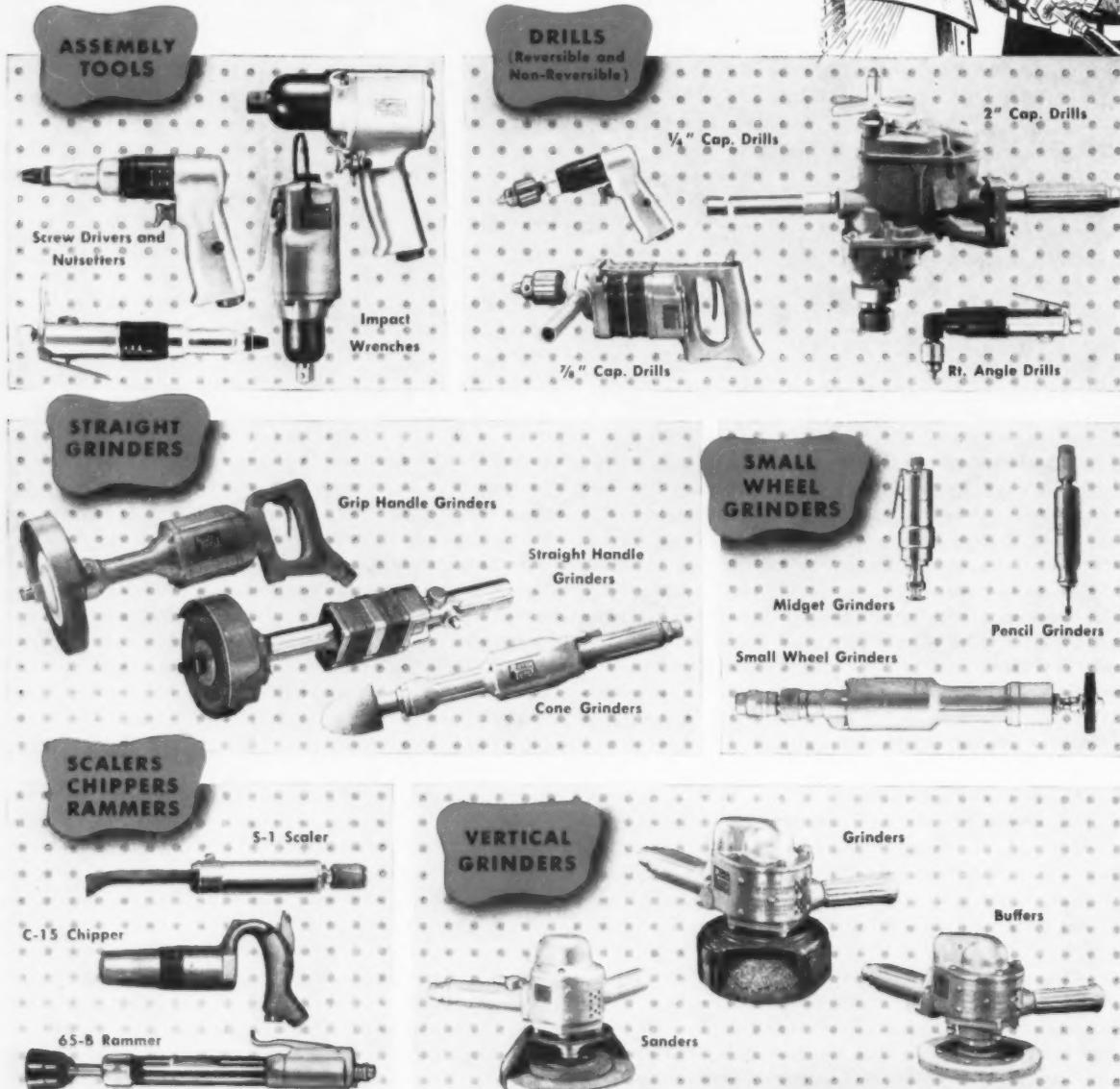
Dr. Young's steel flooring was the answer to architects' problems. Its use became widespread and has since been adapted to panels and decks.

Dr. Young's interest in construction goes back almost 40 years. In 1918 he gave up a teaching position in the chemistry department at Ohio State University to accept a fellowship in building materials at Pittsburgh's Mellon Institute of Industrial Research. The fellowship was sponsored by H. H. Robertson Co.

The arrangement proved a satisfactory one to man, company and industry. After 11 years at the Institute, Dr. Young moved into Robertson's executive suite as vice president. In 1940 he took on added duties as general manager. Eight years later he was president of the company.

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UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

ROTOR
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PERSONNEL

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The Iron Age**SALUTES**

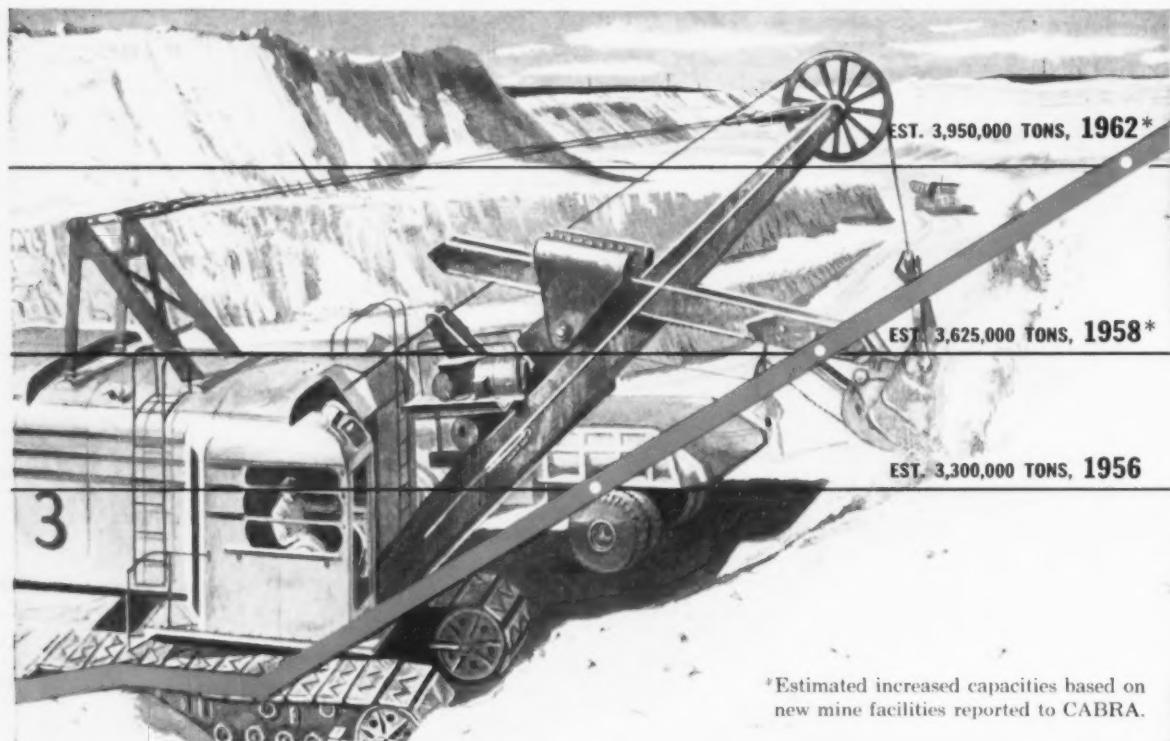
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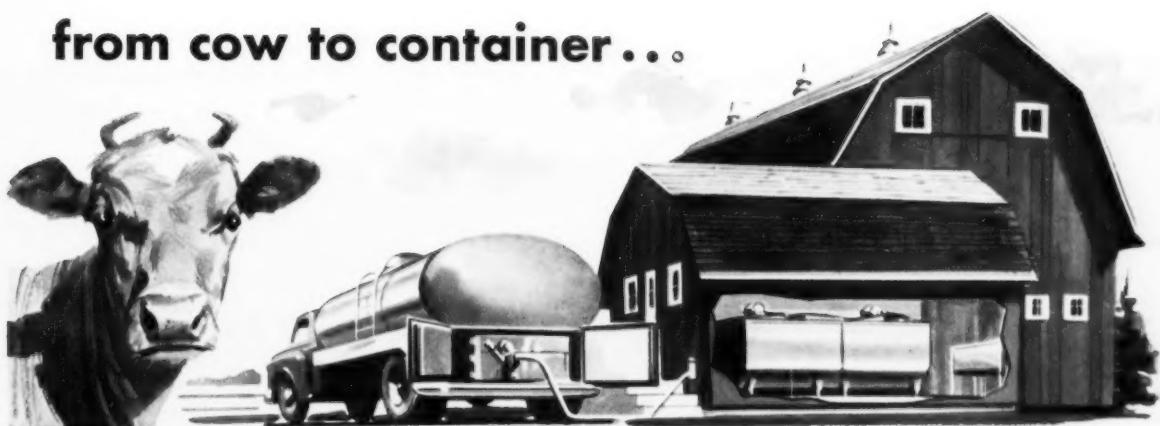
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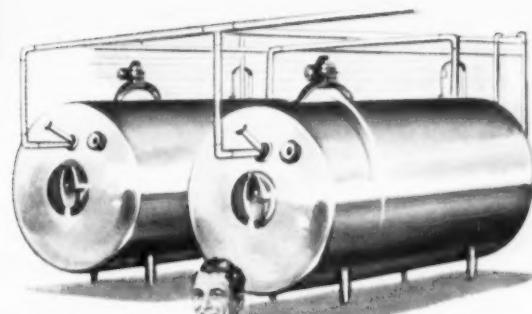
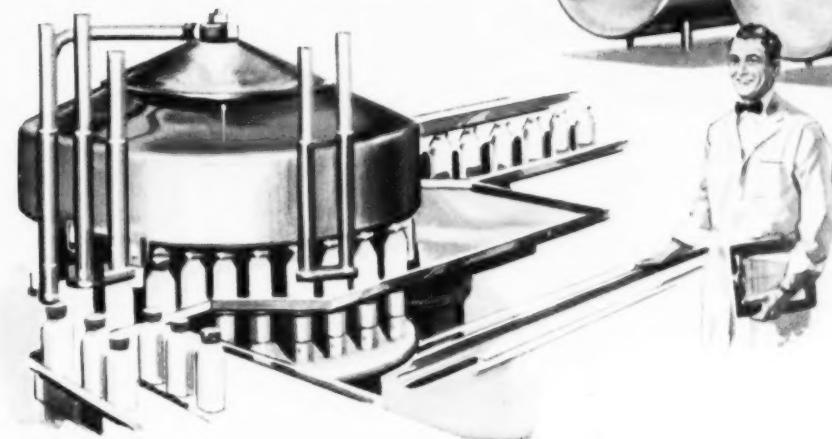
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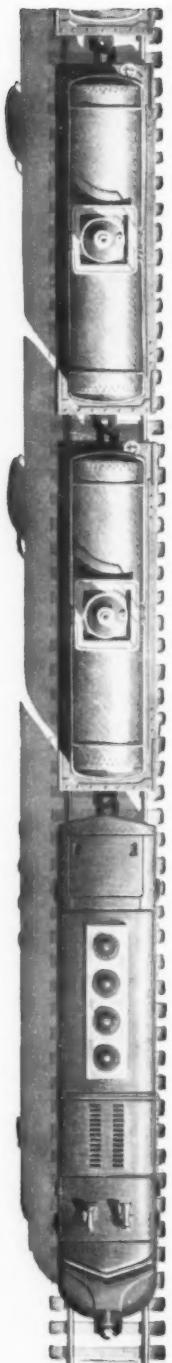
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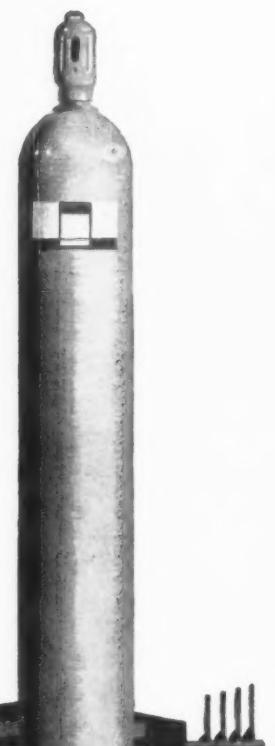
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Wesley D. Hamilton, elected president and chief executive officer, International Steel Co., Evansville, Ind.

Dr. Bela K. Erdoss, elected president, The Korfund Co., Inc., Long Island City, N. Y.

Charles L. Holbert, elected president, H. K. Porter Co., Inc.

Duke A. Garrison, named asst. to vice president, engineering and research, Russell, Burdsall & Ward Bolt and Nut Co., Chicago office; **Frederick E. Graves**, named asst. to vice president, New York.

William S. Ginn, elected vice president, General Electric Co., New York; **Jack S. Parker**, elected vice president.

J. Lee Marsh, appointed vice president, development, Carbide and Carbon Chemicals Co., Div. of Union Carbide and Carbon Corp.

Bland B. Button, appointed vice president, sales, The Diversey Corp., Chicago.

C. Dean Ramsden, appointed vice president and general manager, Pacific Coast Engineering Co., Alameda, Calif.

Herbert E. Ihrig, appointed manager, marketing administration and personnel development, Metallurgical Dept., General Electric Co., Detroit.

John H. Colby, elected vice president and general sales manager, Johnson Service Co., Milwaukee.

Robert P. Gibson, named asst. superintendent, blooming and billet mills, Buffalo plant, Republic Steel Corp.

Ed. O. Reese, named general superintendent, rolled and tubular products, The Youngstown Sheet and Tube Co.

Following appointments are within the General Maintenance Dept., Aliquippa Works of Jones & Laughlin Steel Corp. **Albert B. Millman**, appointed superintendent, General Maintenance Dept.; **John A. Hussey**, named consultant, general maintenance; **Francis T. Zitzman**, appointed asst. superintendent; **O. C. Gochenour**, named general foreman, general maintenance.

Robert G. Schimp, named wire and cable specialist, construction materials, northeastern district, General Electric Co., Bridgeport, Conn.

Melvin A. Young, appointed administrative assistant, Laclede-Christy Co. Div., H. K. Porter Co., Inc., St. Louis, Mo.

E. Weston Hammond, appointed district manager, Worthington Corp., Los Angeles district office; **J. R. Matullo**, appointed district manager, Newark office.



LYMAN A. BLISS, elected president, Union Carbide Nuclear Co., Div. of Union Carbide and Carbon Corp.



JOHN P. POTHE, named director, engineering, The Bullard Co., Bridgeport, Conn.



A. D. MONCRIEFF, elected vice president, Michigan Tool Co., Detroit.



ALFRED J. CHANDLER, appointed sales manager, Brush Div., The Osborn Manufacturing Co.

Simon J. Morana, named director, research, **The Beryllium Corp.**

William W. Deal, named asst. to manager, sales, western area, **American Steel & Wire Div.**, U. S. Steel Corp.

Edward A. Murray, named manager, Chicago district, Sales Dept., **American Steel & Wire Div.**, U. S. Steel Corp.

S. W. Wheeler, named asst. chief engineer, Warren district, **Republic Steel Corp.**

Clyde R. St. John, named general staff metallurgist, **Kaiser Aluminum & Chemical Corp.**, Oakland, Calif.

P. C. Fourney, named manager, Alloy, West Virginia Works, **Electro Metallurgical Co.**

and . . .

RUBBER

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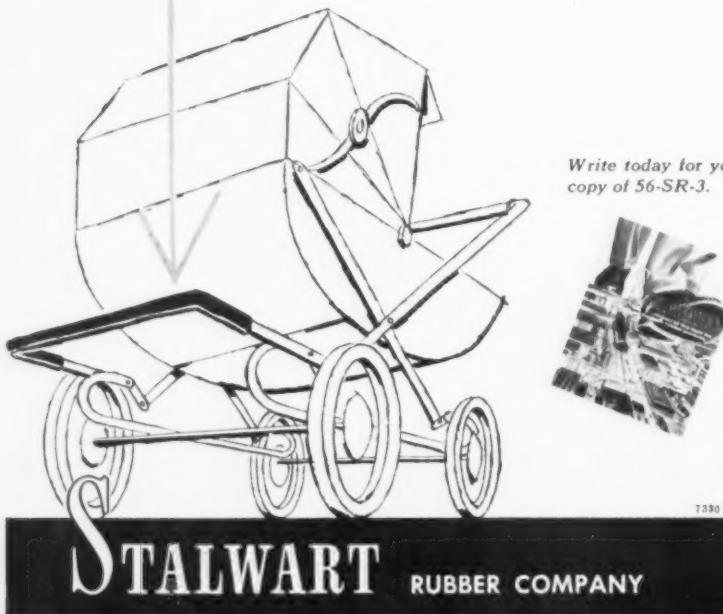
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S. DAVID HARRISON, elected treasurer, **Snyder Tool & Engineering Co.**

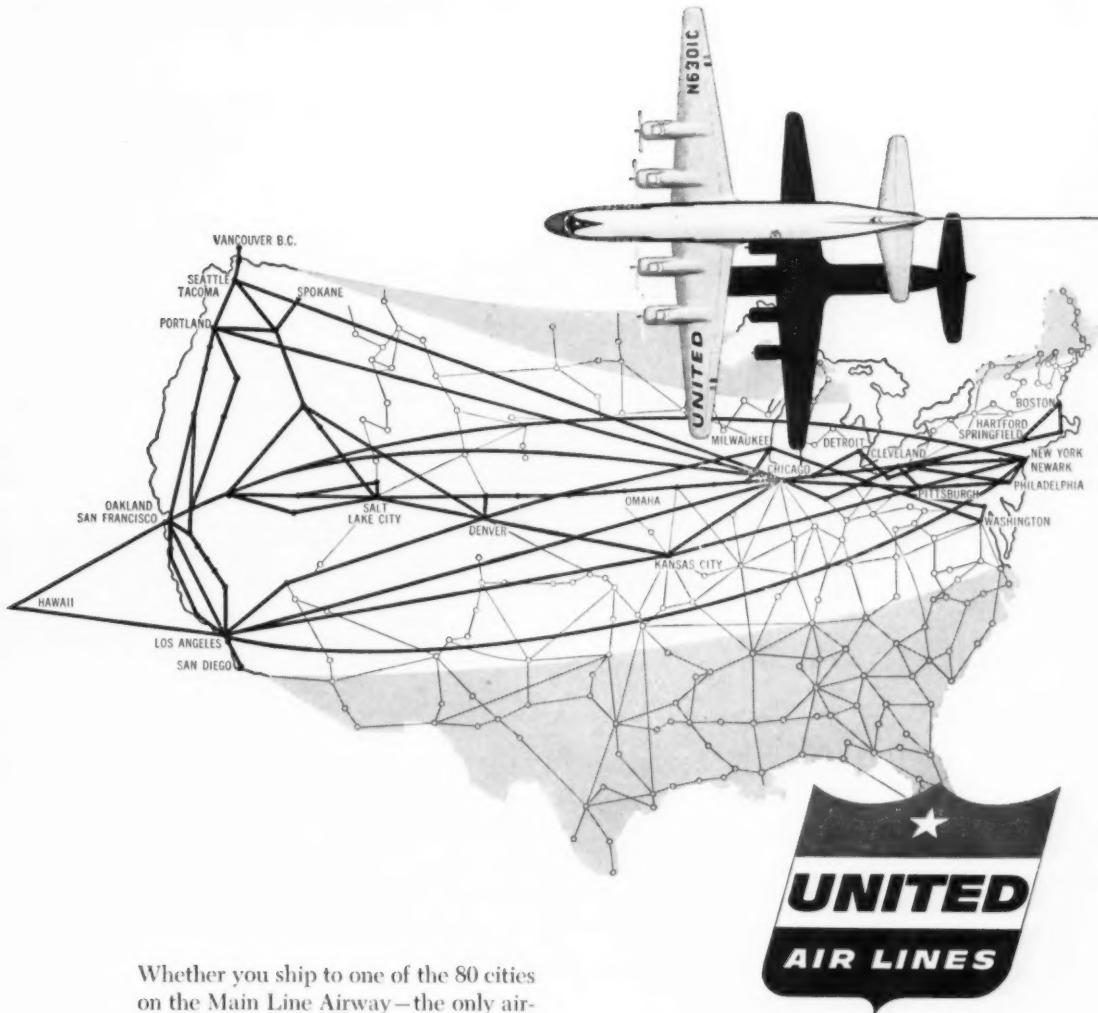


WILLIAM H. GUTERL, named asst. to general manager, sales, **American Steel & Wire Div.**, U. S. Steel Corp.



ROY HAWKES, named purchasing agent, **Harper Electric Furnace Corp.**, Buffalo.

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O. F. Vea, named general manager, Medium A-C Dept., **General Electric Co.**; Bryce W. Wyman, named general manager, Small A-C Dept.

Byron Hughey, named asst. general manager, sales, **The Youngstown Sheet and Tube Co.**, Youngstown, O.; Clarence E. Short, named asst. manager, flat rolled sales, Youngstown; Donald C. Umbel, named asst. manager, western sheet sales, Chicago; Thomas J. Connolly, named manager, export sales, New York; Myron L. Thomas, named asst. to district sales manager, Chicago sales district; Robert W. Walling, named asst. manager, High Strength Steel (Yoloy) Sales Dept.; Frank C. Sterling, named western representative, high strength steel (Yoloy) sales, Chicago.

Wallace H. Dodge, named factory manager, **The Fellows Gear Shaper Co.**, Springfield, Vt.; John E. Angell, appointed factory controller.

James G. Henzel, Jr., appointed applied research engineer, Foundry Dept. Applied Research and Development Lab., **General Electric Co.**, Schenectady, N. Y.

OBITUARIES

Alden Roach, president, Columbia-Geneva Steel Div., **U. S. Steel Corp.**

Charles E. Stone, 70, president, **Interstate Drop Forge Co.**, Milwaukee.

B. M. Sharp, St. Louis district sales manager, **Wheeling Steel Corp.**

Terryl B. Montgomery, 56, chief engineer, Electrical Application Dept., **Allis-Chalmers**, Milwaukee.

Leroy J. Ackermann, 37, eastern representative, **Lindberg-Fisher Div.**, **Lindberg Engineering Co.**



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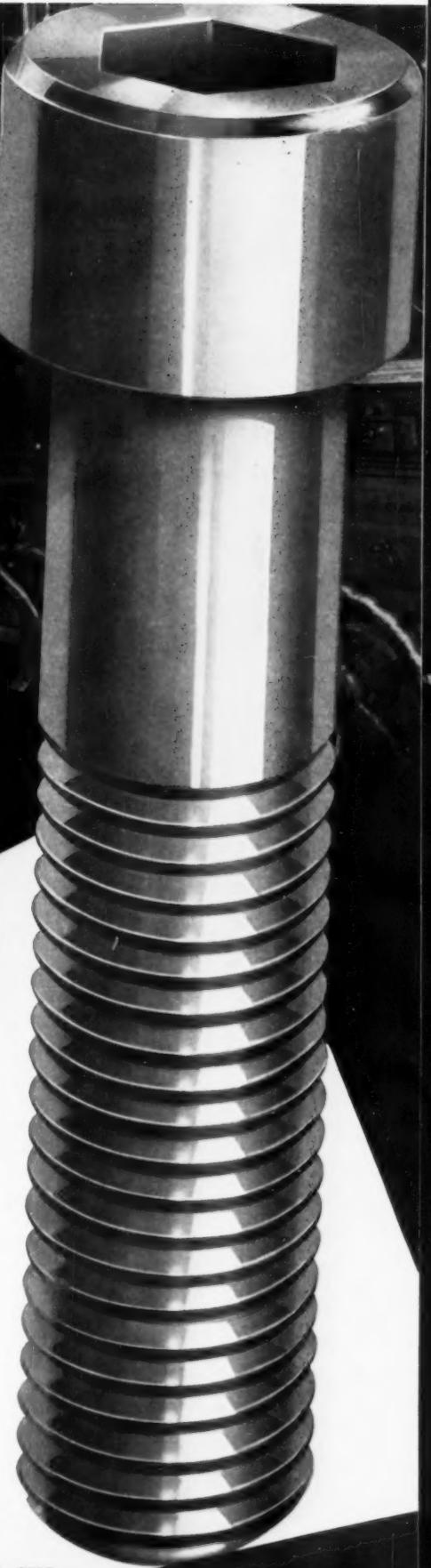
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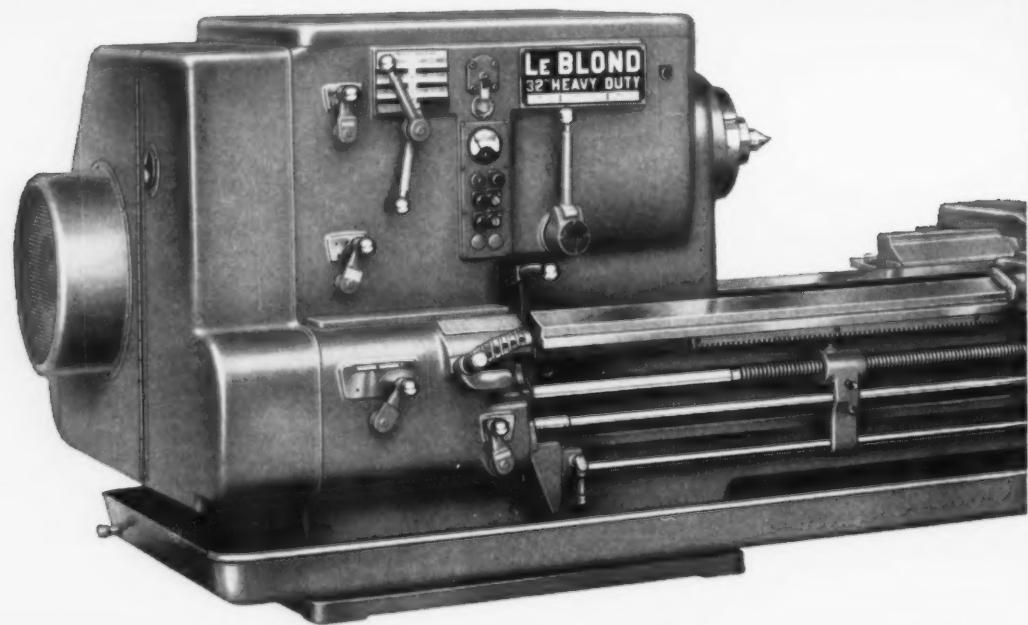
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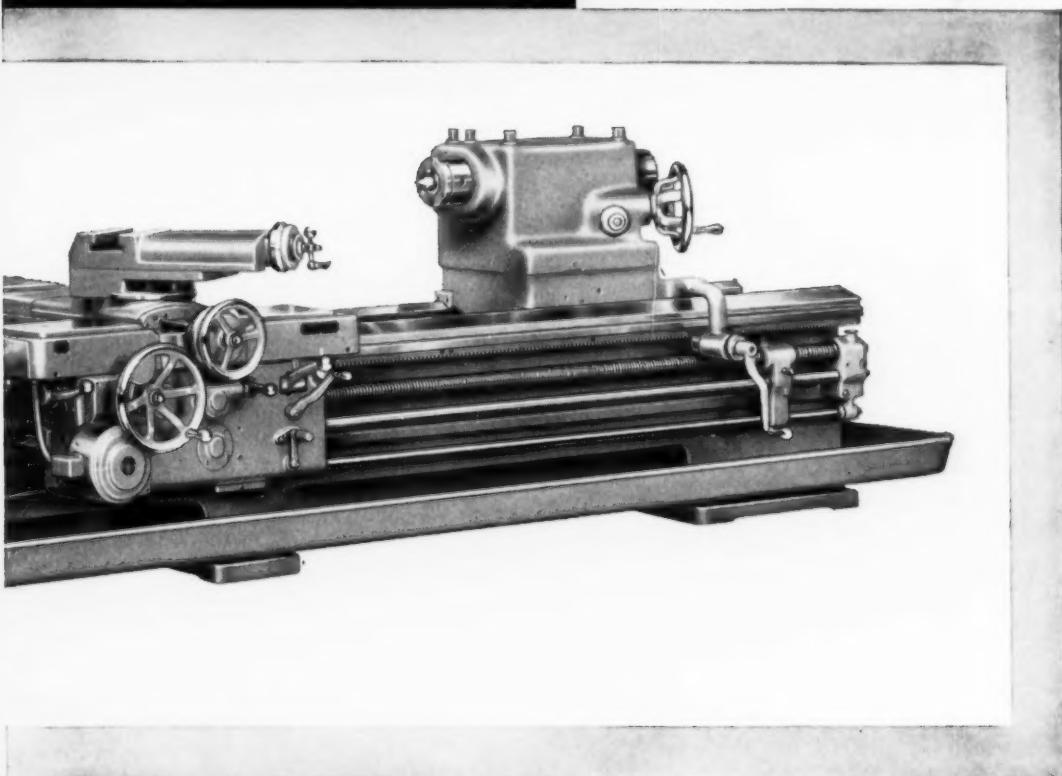
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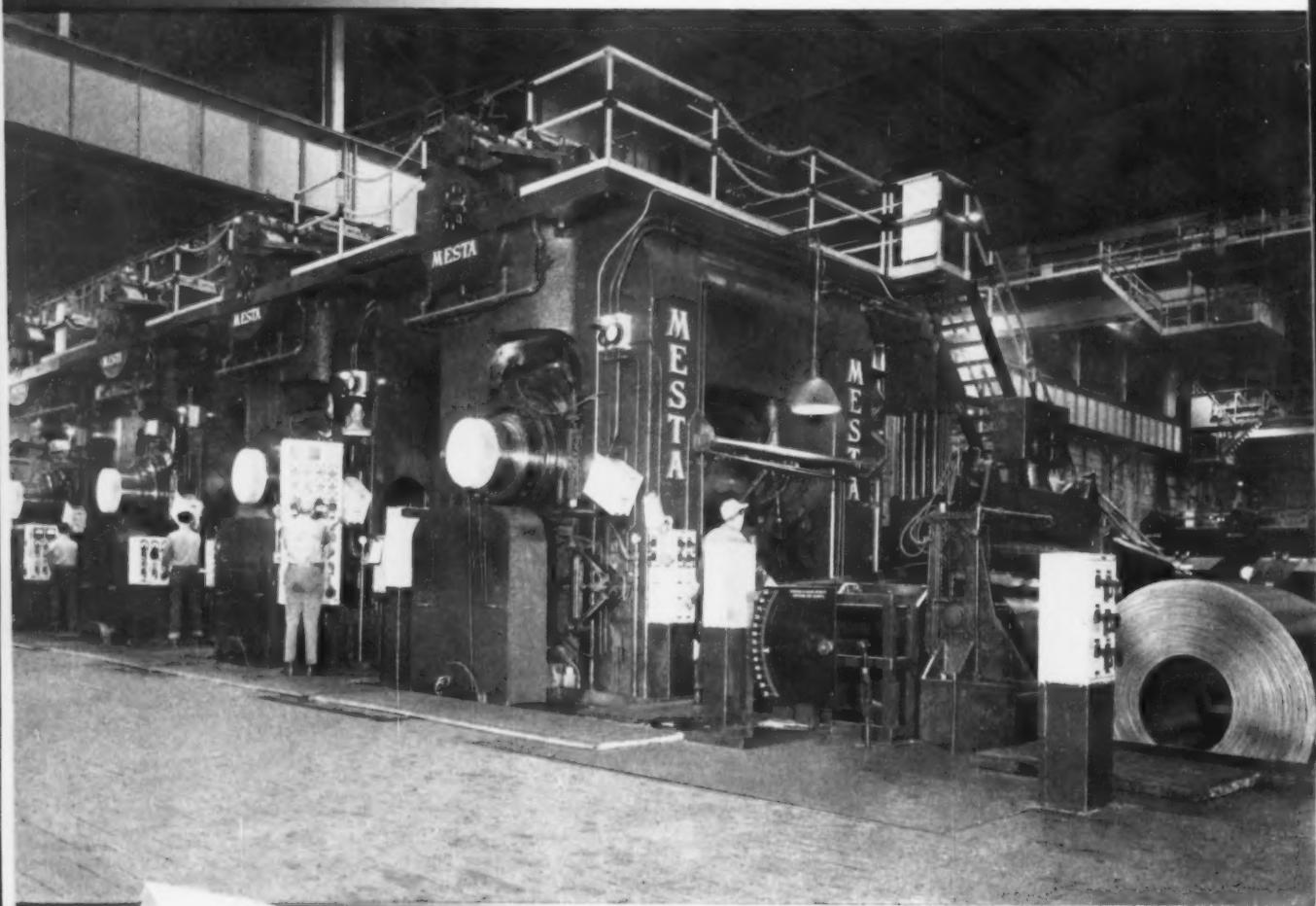


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Tiny signposts—

What Chips REALLY Mean To Carbide Cutters

By HORACE FROMMELT, Consulting Engineer, Philadelphia

◆ Chips from milling operations are sign posts of good or bad practice . . . As such, they're important in detecting causes and cures for a number of milling problems . . . In this case, chip study deals with the use of carbide cutters.

◆ Some key points are these: Watch chip clearance space . . . Chip shape and size . . . Its thickness . . . Method of milling . . . Vibration . . . Each of these factors has a story of its own which leads to better milling practice.

◆ IT'S HARD TO SEE how chips can make the difference between success or failure of a machining job. But they can—particularly those chips formed by carbide tools.

Improperly formed or ejected chips can stall a 50-hp milling machine. Even aluminum chips that can be crushed between the fingers will stall a large milling machine if they're in the wrong place at the right time.

Carbide milling cutters, because of their multiple-tool attack and high chip formation rate, serve quite well in studying metal removal problems. They also help to bring the single-point cutting job into better focus.

The most troublesome chips, or

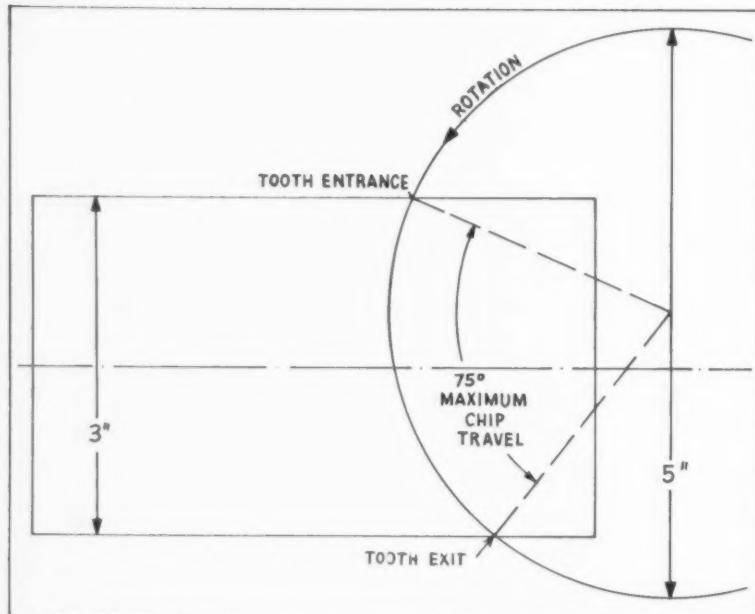
those likely to be, are steel. Cast iron seldom makes chips resulting in machining difficulties—at least not until you consider alloy cast irons. A poor setup between tool and job of aluminum can cause no end of trouble due to chips. Likewise with other nonferrous materials and plastics.

There are few difficulties in milling steel that can't be traced to chip malformation or mal-ejection. Most stem from making a bad chip or not getting rid of a good one.

The old rule for high-speed steel cutters—to use the smallest diameter possible—doesn't hold for carbide. If the cutter is smaller than the 8:5 rule prescribes, get set for trouble. Milling a 5-in. wide

The rule for selecting cutters is: Make the cutter about 1/3 larger than the face width being milled. This gives chips a chance to clear away.

FIG. 1



workpiece with a 6-in. face mill may not stall the machine, but expect shorter cutter life.

The rule laid down for cutter selection is: Use an 8-in. diam cutter for a 5-in. wide workpiece, or make it about one-third larger diameter than the face width being milled. Hence the so-called 8:5 rule. This applies to face mills only.

Fig. 1 shows how, with this ratio, chips have a chance to clear away. The opposite extreme is set forth in Fig. 2. Here, the chips ride with the blades 180°. In the 5:8 setup, the chips ride no more than 75°.

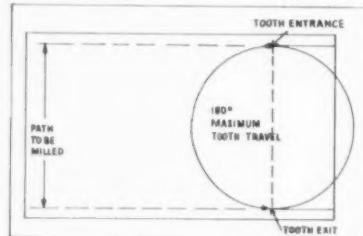
What makes chip interference so damaging to carbide? Aside from stalling a high-powered machine—admittedly unusual—the more the chip rides with the carbide cutting element the greater the friction. And friction is carbide's greatest enemy. So let the chip get out of the way as soon as possible. It'll increase tool life tremendously.

Why the difference between the chips from a high-speed steel and a carbide face mill? It's the speed differential of the two operations. For high-speed steel, it's 80 sfm while for carbide it's 500-sfm—as-

suming that milling is on straight carbon steel.

When a chip from a slow moving cutter rides with the blade, the friction isn't great enough to cause

FIG. 2



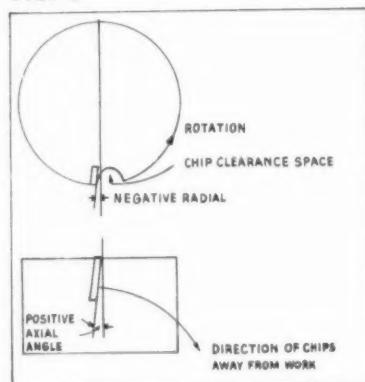
difficulty. But if it's given a ride with the carbide blade at 500 sfm, the chip comes to a red glow in a revolution or two. The chip then welds itself to the blade, body or workpiece.

Use positive axial angles in a face mill whenever possible. Insist on them even if a strong negative radial angle is required to protect the cutting edge. This can be had by increasing the negative radial rake angle leaving the axial positive. The resultant cutting angle is negative and protects the cutting edge. The obtuse angle places the carbide

in compression instead of shear. Carbide has large reserve compression but negligible shear strength.

Give the chip every chance to free itself from the cutter as soon as it's formed. This can be done—or assisted—by giving it the right shove with the right angles. Fig. 3 shows how a positive axial rake

FIG. 3



angle helps to give the chip the right boost away from the workpiece instead of into it.

If a hard heat-treated alloy steel is being face milled, use a strong negative radial with a reasonably good positive axial. This protects the cutting edge. At the same time, it helps to speed the little chip away from the cutter and workpiece.

A third difficulty with chips may arise from using the wrong technique of milling, i.e., upward or downward as in Figs. 4 and 5. There are times when it's wise to use down milling since at the end of the cut (Fig. 5) the chip is thin and readily frees itself from the blade. This is true of some alloy steels, and particularly stainless and titanium.

If the chip sticks to the cutting edge and re-enters the workpiece, it will damage the cutting edge the next time around. This may chip it or perhaps shorten its life. But sometimes the worst happens: the chip becomes incandescent and welds itself to something which usually stalls the machine regardless of its power and size.

There's also another consideration. When milling steel forgings with a scaly surface, it's better to mill upward. Downward milling brings the tooth into and through the hard scale, limiting its usefulness whereas upward milling

breaks through the destructive scale from below.

The shape of the blade at the corner has a lot to do with success or failure in machining. A radius or chamfer on the cutting tool edge helps to extend tool life.

A 45° corner angle carries this idea even further. It definitely aids edge life and metal removal—within limitations. A 45° corner angle on a face mill changes the chip geometry which may help or hinder. First, chip width increases by about one-third. This may be the cause of the chip not freeing itself. Fig. 6 shows the geometry involved. If short tool life is a problem, try a 90° corner angle. This will soon tell whether chip width is causing the trouble.

A shoulder cut with a face mill, as shown in Fig. 7, increases the tool edge distance and time the carbide blade is in contact with the work, thus increasing friction and edge life problems. If such is the case, use another tool—but not with carbide elements for this kind of cut.

When the workpiece calls for a step or shoulder in the finished piece, then the 90° corner angle cutter or face mill must be specified. It is then that a carbide face mill should probably be ruled out in favor of a high speed steel face mill or a carbide slab mill.

Vibration's a headache

Chip trouble arises, too, from vibration. The cause may be due to the machine, workpiece, cutter, or all three. Whatever the source, it can turn a potentially successful job into failure.

Here's why: Vibration means impact blows against the carbide thus causing early flaking and chipping. Even worse is that vibration may cause the chip to pound itself into or onto the blade to ride through the workpiece. Friction may cause the chip to weld itself to the cutter body or the job. The possible result: A 50-hp machine stalled by a 0.010-in. thick chip.

Space ahead of the cutting blades allows chips to form. Making a chip requires power—lots of it. If it could be sheared off without getting in the way of the tool, then power required would depend on shear strength of the steel alone.

FIG. 4

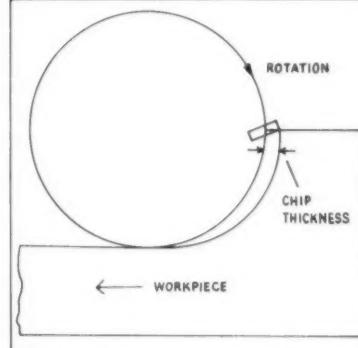
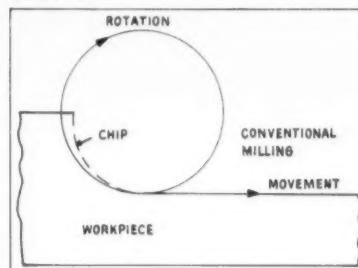


FIG. 5

As it is, the amount of power for face milling far exceeds that needed for shearing. Chips which crowd the cutting edge create abrasion and friction, impairing tool life drastically. Under extreme conditions, it may stall the machine.

Under normal conditions, a cutter with cramped chip clearance space may do if the cut is not too deep. But there's a fine line of difference between a good chip and a bad one. An increase of only 0.020 to 0.030 in. in depth can spell poor machining. Heavy rugged cuts call for increased chip clearance space. It's important to good metal removal.

If a chip is doubled in thickness, the power required to remove it is not necessarily doubled. It may actually be many times more if the chip is too thick for the space and design of a cutter. On the other hand, if the chip is not hindered in its flight from the parent material, the amount of power to remove a chip 0.020 in. thick is somewhat less than double that for a 0.010 in. thick chip.

The amount of power required to produce a thicker chip as compared to a thinner one depends on two major factors: (1) the power needed to produce it and (2) the power to eject it. The material being machined governs the first whereas

the second factor increases with each increase in thickness until the machine stalls due to its inability to get rid of chips.

If the feed rate is doubled, say from 25 to 50 ipm, the power requirement need not double under certain conditions. First, a chip 0.010 in. thick and one 0.020 in. thick require the same power for shearing. Any increase is due to the power demand to form the chip.

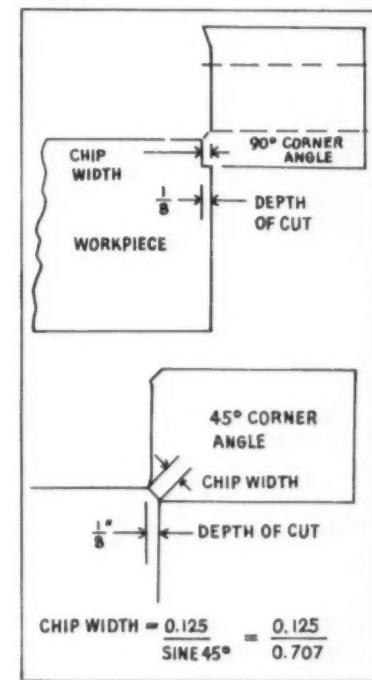
Heavy cuts are better

Taking a heavy chip when milling with carbide cutters results in longer tool life and better practice providing that the greater chip thickness can clear the work. If it can't, instead of the power requirement being just slightly higher, it may be beyond that which the machine can deliver.

When milling a heavy chip with carbide elements, it might be well to set the minimum at 0.010 in. However, the difference between a chip 0.010 in. and 0.020 in. thick may also mean the difference between a smooth operation and a stalled machine or broken cutter. The thicker chip in cramped quarters may weld itself to the cutter body or workpiece.

Good weldability in a chip is not welcomed. If a chip tends to weld itself to either the workpiece or

FIG. 6



The work required to remove a chip heats the tool, the chip or the work piece. Since carbide conducts heat poorly, the heat appears mostly in the chip.

cutter body, it can be avoided by increasing chip thickness, chip cross-sectional area, or both. The work which removes a chip from a parent block heats the tool, the chip or the workpiece. Since carbide conducts heat rather poorly, the heat appears mostly in the chip. Thin chips may heat to a red glow, or even to a higher temperature. As a result, welding takes place—so much so that blades break and machines stall.

Increasing chip thickness or cross-sectional area increases the amount of heat required to bring the chip to weldable temperature. Sometimes, this is sufficient in itself to prevent welding. But keep in mind that an increase in chip width by the 45° corner angle decreases chip thickness since the

of the revolutions per minute and surface feet per minute. For example, if SAE 1020 steel is being milled at 1000 rpm and the chips appear burnt, it's safe to conclude that blade life will be very short. On the other hand, if the same steel is being milled at 250 sfm and the chips are silvery, you probably need more speed.

Chip thickness, as a factor, heads the list in importance in carbide milling. Its arithmetic determination is a must for every mechanic, set-up man and production executive. Guesswork only leads to serious trouble.

Never engage a milling machine feed lever without first knowing what the exact chip measurement will be. It's simple, yet seldom used.

Assume the cutter has been chosen by the 8:5 rule and the surface-feet-per-minute rate has been based on the kind of material being milled. The feed rate can then be determined by multiplying the chip thickness by the number of teeth by the revolutions per minute of the spindle. This feed rate should be satisfactory providing the machine's horsepower rating is not exceeded.

Start with a 0.010 in. thick chip and go up if possible. The reason for this is that it's a chip problem. If you mill a thin chip, say 0.005 in. or less, chances are that blade travel will slide into the cut. Every machine has some play. That's expected. Hence a thin chip will cause the cutting edge to slide along the workpiece before taking its bite. This sliding friction is the worst condition for the carbide cutting edge.

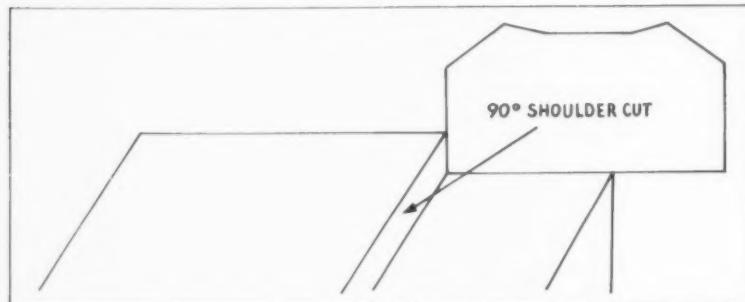
There's some opinion that "most milling cutters have too many teeth." This may be partially true. The fewer teeth in a cutter, the greater the chip load. Assuming a rate of 20 ipm, an 8-tooth cutter will have half the chip load of a 4-tooth cutter.

In carbide milling—in machining, for that matter—nothing is more important than chips. Forming good ones and ejecting them clear of the job are signs of good practice.

But check chips first if there's something wrong with the life or blade wear or breakage or machine stalling. Look to (1) chip clearance space, (2) size, width and area of the chip, (3) chip thickness, (4) type of milling; whether up or down, (5) shoulder or free cut and (6) vibration. Each of these factors plays an important part in chip formation and thus, in turn, on whether machining practice is good, bad, or indifferent.

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FIG. 7



volume of metal removed is the same whether the tooth is set at a 45° or 90° angle if feed and speed are the same. If welding still occurs, try something other than a 90° corner angle. It may be that the increased width offsets the decreased thickness.

An experienced eye helps to evaluate metal removal by the appearance of the chips. Look for evidence of a crumpled, bent or distorted chip. If all chips are uniform in shape, and with little or no evidence of crowding, it indicates good chip formation and removal.

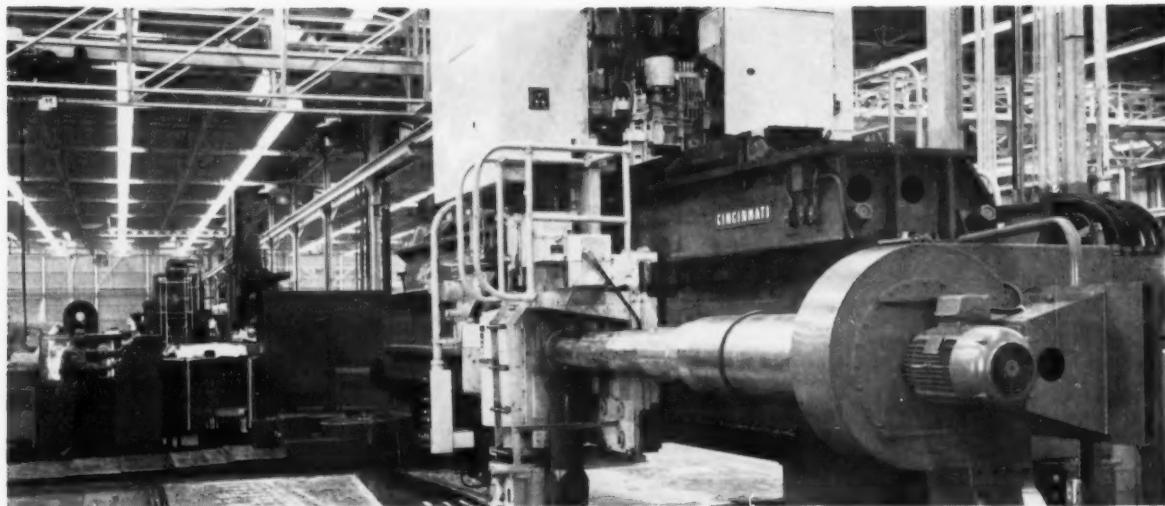
Watch, too, for the color of chips. If they appear burnt and have a deep blue color, it indicates that the surface foot rate is too high.

Place such visual evidence alongside the actual machining figures

Here's how to figure it. Divide the feed rate in inches per minute by the revolutions per minute of the spindle. That's the feed per revolution. If the feed rate is set at 20 and the revolutions per minute are 500, the feed per revolution is 0.040 in., or the amount of metal removed in one revolution. With an 8-tooth cutter, chip thickness is 0.005 in. and with a 4-tooth cutter it'll be 0.010 in.

Another approach is to find the number of tooth contacts per minute. Thus, if a cutter has eight teeth and the revolutions per minute are 400, there will be 3200 contacts per minute. Then divide the number of tooth contacts into the feed rate.

Avoid chip thickness of less than 0.010 in. except in unusual cases.



MILLING HEAD rides on crossbeam to slot and contour aluminum slabs automatically. Telescoping duct (foreground) sucks away chips.

With tracer cams—

Skin Miller Contours Slabs Automatically

♦ FULLY AUTOMATIC, continuously operating skin milling machines are now in use. Individual cam setups program the millers precisely through their 1 $\frac{3}{4}$ -hour cycles.

Reportedly the first such units with completely automatic control, two of the new machines are working side by side in the Los Angeles plant of North American Aviation Corp. Cincinnati Milling Machine Co. supplied the equipment.

Take deep cuts

In its 1 $\frac{3}{4}$ hour cycle, each milling machine takes up to 120 non-parallel cuts in workpieces measuring as large as 5 x 20 ft. Slabs of 75ST (now 7075S) aluminum are heavily slotted and contoured, down to a final thickness of 1/16 in. in some sections. Finished panels form top and bottom, left and right wing sections for jet fighter airplanes.

A single operator controls all operations through the full cycle from a console station located near the machine.

Slabs of aluminum load on the milling machine, and are held in place from beneath by a vacuum chuck. This avoids vibration during cutting. The machine working surface is set at the floor line.

The milling head is slung from the main support beam. Gantry saddles hold the beam at its extreme ends. The saddles ride on transverse rails to permit accurate motion across the width of the workpiece.

The main support beam pivots on the gantry saddles in angular slotting operations.

The cutter spindle rises and falls in its contouring motion. Cam bars $\frac{1}{4}$ in. wide and stacked side by side control this. Cams are traced, one after another, for cumulative sequence operation. Con-

tour cam bars are housed in a compartment sitting on a separate beam above the main support beam. A total of 120 automatic slotting and contouring cuts is required to mill one right- and one left-hand part.

Chips whisked away

Chips are removed by a vacuum setup. As the cutter head moves back and forth cross the workpiece, the chip collector duct telescopes to match the distance from the edge of the machine. The collector system removes over 99 per cent of the chips. A vacuum separator deposits them into chip drags beneath the floor grating.

There's no need for the operator to move from his console control while the machine operates. An auxiliary control located near the milling head is used only for set-up and for adjusting cutters, templates and other equipment.

New Line Plates Contoured Parts With Few Rejects

By HERBERT CHASE, Consultant, Forest Hills, N. Y.

- Diecast parts are copper-, nickel-, and finally chrome-plated on one automatic plating line with less than 2 pct rejects . . . A complete cycle takes 2½ hours.
- In copper undercoating, intermittent current is used—10 seconds "on" and 1 second "off" . . . Parts undergo electrocleaning both before and during plating.

• REJECTED chrome-plated diecastings total less than 2 pct on one automatic plating setup now in operation. The variety of parts plated makes the low reject rate all the more remarkable.

Zinc alloy diecastings are plated successively with copper, nickel and chromium on the conveyorized line, which carries racked workpieces through a complete cycle in little more than 2½ hours. Intermittent current is used for copper plating. Bleeders on each rack avoid excess current at sharp corners of the contoured workpieces.

The modern automatic plating system is located at the Syracuse, N. Y., plant of Brown-Lipe-Chapin Div., General Motors Corp.

Workpieces are diecast and plated in the same plant.

Racked parts first soak in a di-phase cleaner, then in an alkaline bath. They enter the di-phase tank, descend through a 2-in. layer of kerosene and into a solution below containing alkaline cleaner and 3 pct emulsifier.

The solution in the second tank is heated to 170-180°F and contains an emulsifier "breaker" plus a mild alkaline cleaner. Racks enter in still solution, move through an air-agitated section and lift out in a second still portion of the bath. A cold water spray follows. Spray water is recirculated.

Operators then hang racks on the plating conveyor on 60-in. centers. The first tank on the line contains a proprietary cleaner used only if parts retain excess kerosene.

Double-cleaned first

Diecastings may proceed directly to the second tank. There they soak 23 seconds in a 4-oz per gal cleaning solution heated to 130°F.

Then comes an overflow dip-rinse, followed by another 23-second soak in a 4-oz per gal solu-

tion of a different cleaner at 130°F.

Next follows a short water soak in a weir overflow tank with a siphon breaker. The latter is arranged to give a skimming action.

Reverse electrolytic cleaning takes place then in a 4-oz per gal alkaline cleaner solution heated to 130°F. Zinc alloy workpieces form the anode. Current density is 10 amp per sq ft.

After a cold rinse in a tank with a weir and siphon breaker, parts dunk 23 seconds in dilute acid solution to neutralize any remaining alkali. This solution contains 0.6 to 0.8 oz per gal citric acid, and is recirculated.

Two more cold water rinses follow, then parts enter a 125°F cop-

TABLE I
Copper Strike Solution
Composition

	oz per gal
Copper (metal)	3.5
Free cyanide	1.5
Carbonate	2.5

per strike solution. Forged copper ball anodes housed in spiral steel baskets produce the strike at 35 amp per sq ft. Table 1 gives solution composition.

Bright copper plating at 170°F follows immediately in a 22,000-gal tank. Solution composition shows in Table 2. Proprietary metallic-organic brighteners improve plating in areas of high and low current densities.

The 40 amp per sq ft current is intermittent—plating for 10 seconds, followed by a 1 second “off” interval. Parts are agitated and the solution is continuously filtered.

From the copper plating tank, parts enter a reclaim rinse. This rinse is pumped back into the plating tank daily as makeup solution.

Another water rinse follows, then a 23-second reverse electrocleaning operation at 12-15 amp per sq ft. The solution for this contains 6-oz per gal alkaline

arms are constantly agitated, and the solution is continuously filtered. The 60-in. long anodes are bagged. Plating takes 23.8 minutes with current density of 50-60 amp per sq ft.

Nickel plating is followed by a reclaim dip, then by a rinse in circulating water and finally by a spray rinse. The resulting plate is bright and does not require buffing before chrome plating.

Parts progress through a 23-second dip in 0.3 pct hydrofluoric acid, then a 0.01 pct chromic acid dip. Chromium plating takes 5 minutes in a standard solution at 105-112°F and 150 amp per sq ft current density. The solution contains 46 oz per gal chromic acid and 0.18 oz per gal sulphuric acid.

TABLE III
Nickel Plating Solution
Composition

	oz per gal
Nickel sulphate	40
Nickel chloride	8-9
Boric acid	7
Nickel (metal)	10.5

Chrome plate solution dragout is recovered in a cold water reclaim rinse. Two hot dip-rinses, the last in deionized water, complete the procedure. Hot air drying follows.

Parts thus plated are bright and ready for use in most cases.

TABLE II
Copper Plating Solution
Composition

	oz per gal
Copper (metal)	6.5
Free cyanide	1.0
Caustic potash	3.4
Carbonate	8-10
Tartrate	8
Metallic-organic	—
brighteners	—

cleaner. Another water rinse completes operations on the copper line.

Racks continue on the conveyor to the nickel line. First operation there is a 23-second dip in 1 pct sulphuric acid solution at room temperature. Nickel plating follows immediately in a 40,000-gal tank. Table 3 lists composition of this proprietary plating solution.

Temperature there is held to 140°F and pH between 3.0 and 3.5. Proprietary brighteners and wetting agents are used in the bath. Both solution and rack supporting

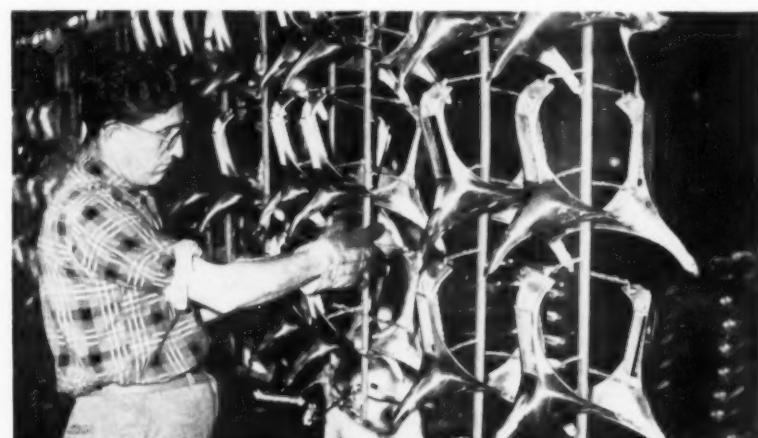
Chrome Plating Sequence

1. Di-phase precleaning
2. Alkaline Cleaning
3. Electrocleaning
4. Copper strike
5. Bright copper plate
6. Double rinse
7. Electrocleaning
8. Rinse
9. 1 pct H_2SO_4 dip
10. Bright nickel plate
11. Triple rinse
12. 0.3 pct HF dip
13. 0.01 pct CrO_3 dip
14. Chrome plate
15. Triple rinse
16. Hot air dry

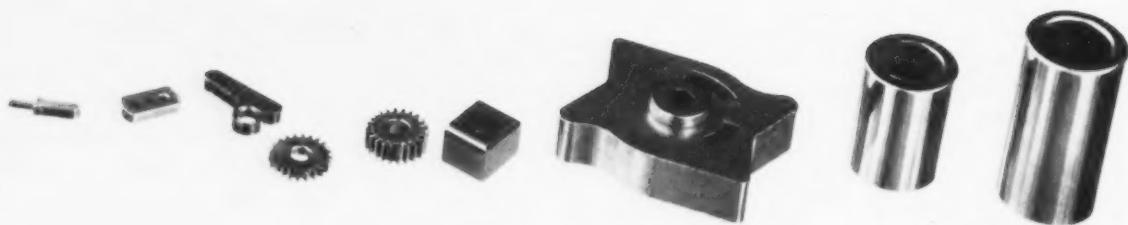
About 2 pct either require some color buffing, or are scrapped and remelted because of defects.

Zinc diecast parts for interior use receive the same treatment and are plated to the same thickness, even though service requirements are less severe. Departing from standard plating procedure would require a separate plating line. The savings that might result from plating more lightly don't justify this.

The same procedure is employed in plating steel stampings on another line, except that cleaners on that line are strongly silicated.



CURRENT BLEEDERS avoid burning at sharp ends of workpieces. Less than 2 pct of diecast parts are rejected after plating.



TYPICAL OF powdered metal products which can benefit from carbonitriding are these business machine and automotive parts.

Need stronger, low-cost parts?—

Carbonitride To Step Up Powder Iron Properties

By LARS TROBERG, Research Metallurgist, Keystone Carbon Co., St. Marys, Pa.

♦ Powder metallurgy has strengths which have won it a respected place among metal fabricating techniques . . . Carburizing permits closer control over many ferrous-part properties . . . But it's of limited usefulness with plain iron powders.

♦ Recently, considerable work has been done in carbonitriding such powders . . . Both medium- and high-density powders were studied . . . Conclusions: where higher hardness and hardenability are called for, carbonitriding is a helpful tool.

♦ PLAIN-IRON powdered metal parts have certain highly desirable properties. By carbonitriding, some of these properties can be improved, making such parts even more suitable for present uses and opening up new applications for such powders.

Keystone Carbon Co., Inc., St. Marys, Pa., has done considerable experimental work in this area. It finds carbonitriding works well both on low and high density powders (high densities are important for precision structural parts, where good wear resistance must couple with toughness and strength). Carbonitriding offers an advantage over carburizing in that it's not as sensitive to processing variables.

The company's conclusion: Where structural parts need higher surface hardness and hardenability, carbonitriding's a helpful tool.

Several factors started the company off in its studies. It's been generally accepted practice in the highly competitive powder metallurgy field to add graphite to iron powder mixtures, as an inexpensive way of improving properties of ferrous parts. Most of this combines with iron during sintering, but some is consumed by reduction of iron oxides in the powder. Adding extra graphite compensates for this loss. An electrolytic iron powder with a low percentage of oxides needs less graphite than other powders.

Another factor figures into getting best results with graphite addition. It's the need for balancing carbon potential of the furnace atmosphere against desired carbon in the finished product. Otherwise, surface decarburization can spoil the product.

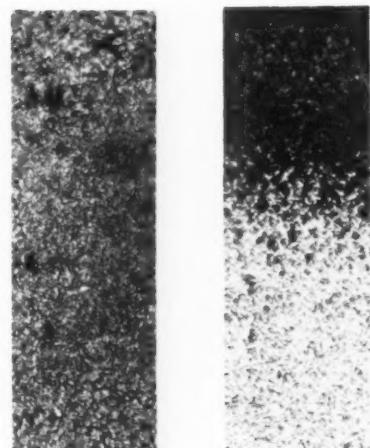
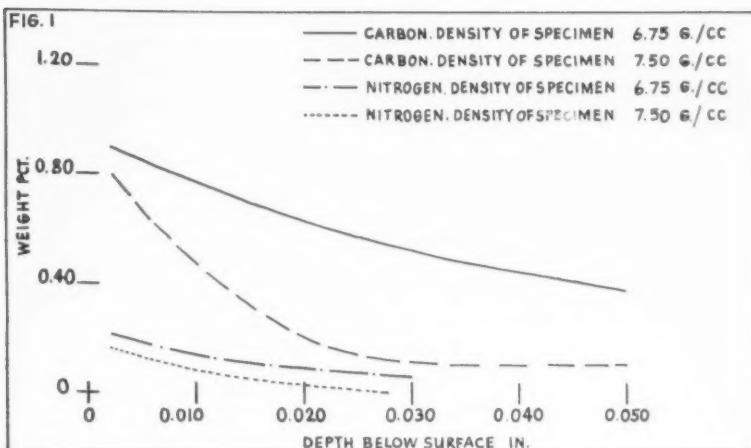


FIG. 2. Microstructures show different diffusion rates in iron powders of (A) 6.75 g/cc density and, (B) 7.50 g/cc density.

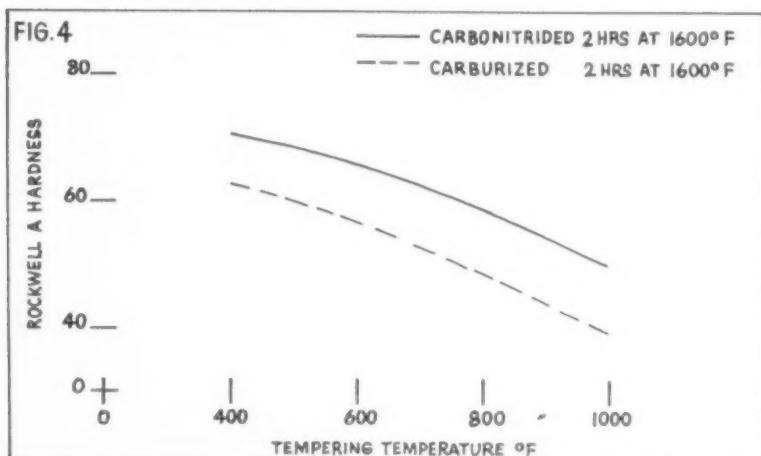
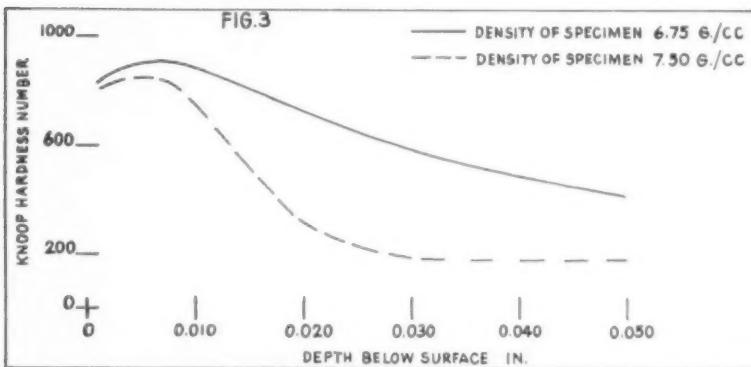


FIG. 4. Surface hardnesses of both carbonitrided and carburized specimens are shown plotted as a function of tempering temperature.

In making high-density parts, there are several disadvantages to adding graphite directly to the iron powder. It's better to form parts to the desired density first, then carburize.

Pack carburizing is one way of doing this. And it's frequently used. But for best control of case composition and case depth, gas carburizing in a controlled atmosphere furnace is recommended. Gas carburizing is well adapted to turning out powdered metal work requiring close dimensional control and good surface finish.

Carburizing has its limitations, though. With ordinary iron powders it's frequently impossible to meet hardness and hardenability specifications by carburizing and quenching in mineral oil. This because of the low percentage (or complete absence) in iron powders of such elements as manganese, nickel or silicon. It's known that nitrogen dissolved in ferrite is especially helpful in bringing plain iron's critical cooling rate down.

And so the decision to investigate carbonitriding.

For experimental purposes, specimens were pressed of nonelectrolytic iron powder to densities of 6.76 g/cc. Sintering followed. Then some specimens were re-pressed to densities of 7.50 g/cc. Specimens were made to standard ASTM proportions.

Properties prior to carbonitriding are:

Carbonitriding investigations were carried out in an electrically-heated, gas carburizing furnace with protected quench

For 6.75 g/cc density powder: Tensile strength 24,700 psi; Yield strength 13,500 psi; Elongation (in./in., pct) 13.0.

For 7.50 g/cc density powder: Tensile strength 39,000 psi; Yield strength 24,000; Elongation (in./in., pct) 33.5; Hardness RA 23.

Carbonitriding investigations were carried out in Leeds & Northrup protected-quench Homocarb furnace. Parts for carbonitriding are placed on screen racks, held together in a steel frame. The load is then pushed manually into the muffle of the electrically-heated furnace.

Atmosphere is created by gasification of a special fluid in the furnace chamber, to which anhydrous ammonia is also added. A high volume fan distributes atmosphere evenly around the parts by forced convection, for uniform carbonitriding.

Parts are quenched in oil at the end of the carbonitriding cycle, by a pneumatically operated elevator device. Quenching is accomplished within the furnace, under atmosphere, without exposing parts to air.

Carbonitriding at 1600°F for two hours produced the curves for carbon and nitrogen gradients shown in Fig. 1. These were determined by layer analysis. Graphical interpolation of these curves gives a surface carbon content of about 0.9 pct and surface nitrogen of about 0.2 pct. In the untreated condition, carbon and nitrogen present in the parts are at levels of about 0.11 pct and 0.005 pct respectively.

Compare penetration

It's interesting to compare depths of carbon and nitrogen penetration for specimens of densities 6.75 and 7.50 g/cc.

Such comparison shows that, whereas a low density permits a deep diffusion of both carbon and nitrogen, a high density shows a sharp transition from the carbonitrided case to the core. This behavior shows photomicrographically in Fig. 2. Deep diffusion of

carbon and nitrogen causes considerable growth of low density parts. High density parts on the other hand, exhibit excellent dimensional stability during carbonitriding.

Knoop hardness tests on carbonitrided, fractured and polished specimens, disclose the same hardness at different depths below the surface (Fig. 3). Compare the depth of hard case shown with the carbon and nitrogen penetration exhibited in Fig. 1.

For most applications the carbonitrided powdered metal is used as quenched. Structural parts requiring better ductility than that afforded by the as-quenched condition can be tempered.

Attains high hardness

Fig. 4 shows surface hardness for powdered metal, carbonitrided to RA 73, plotted against tempering temperature. Tempering for one hour is followed by slow cooling. Maximum hardness attainable by gas carburizing to the same carbon content, followed by iden-

tical quenching, is only RA 65. The tempering curve for carburized parts is also reproduced in Fig. 4.

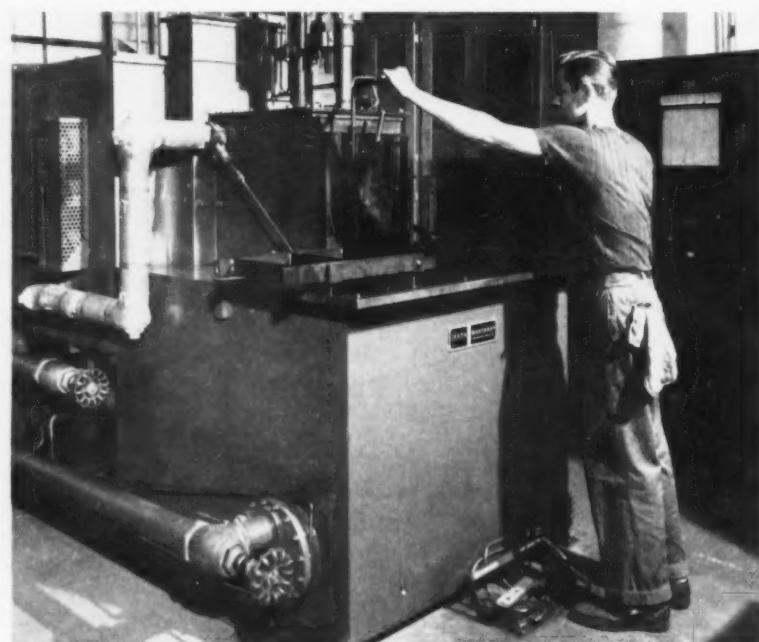
Carbonitrided parts which were tempered at 800°F had the following properties:

For 6.75 g/cc density powder: Tensile strength 101,000 psi; Yield strength 88,000 psi; Elongation (in./in., pct) 1.5.

For 7.50 g/cc density powder: Tensile strength 59,000 psi; Yield strength 43,000 psi; Elongation (in./in., pct) 2.0.

Lower tensile and yield strengths shown by the high density material as against the low density powder is due to the lesser depth of diffusion of carbon and nitrogen in the denser powder. To homogeneously carbonitride powdered metal with density of 7.50 g/cc a long carbonitriding cycle is of course necessary.

Carbonitriding such higher density parts is therefore only practical when they are of thin cross section such as washers, spacers, pinions and the like.



POWDER IRON parts carbonitride to RA73 hardness in this protected-quench carburizing furnace. All the foregoing graphs and photomicrographs are based on the same carbonitriding cycle—2 hours at 1600°F.

◆ COINCIDENT with production changes on its rear axle housings, Buick Motor Div's sheet metal plant has installed new equipment to produce flanges for the torque tube used in Buick cars.

The flange is of 1008 hot rolled rimmed steel of deep drawing grade. It is 0.165 in. thick, the strip for four pieces measuring 15-7/16 x 61-5/16 in.

First drawing is done on a Verson mechanical-hydraulic press, with a 450-ton pressure applied on the ram. The blank holder in this press operates hydraulically. This is partly to adjust pressure on the holder to the proper value initially, partly to make resetting easy after die changing. The press both blanks and makes the initial draw in the stock, which feeds automatically in strip form, a flange being left at the open end of the drawn cup.

Six-die progression

Cups move next to a 750-ton Clearing press. Shown above, this is equipped with six separate dies that are served by a Sheffield "Press Pacer" or transfer mechanism which shifts workpieces automatically from station to station. First three dies make successive redraws until the cup attains its required depth. Then, in the fourth die, a hole is pierced in the bottom.

Drawing of the main side wall is symmetrical about the flange axis. But the hole pierced in the small end is offset 0.48 in. from the flange center line, after which a collar is drawn around the hole. At the final station, the flange is trimmed. The piece then drops into a chute and onto an elevating belt which deposits the stamping in a tote box.

The accompanying picture shows the stamping moving through successive operations in the second press.

The second press is fed with drawn cups by a shuttle. This is loaded by hand. Thereafter, the work piece is not touched by hand but advances by the transfer mechanism through successive stations.

Press Draws Heavy Torque Tube Flanges



INITIALLY DRAWN in 1500-ton press, cups transfer automatically through six successive dies on this 750-ton press. Chute catches pierced-out slugs.

When the hole is pierced at the fourth station, the punch pushes the slug into the upper die. It remains there until the die on the press ram is near the top of its stroke, when the slug ejects and drops into an inclined chute at the back of the press.

As this chute's upper end must slip between the two halves of the die to catch the slug, the chute must withdraw before the die starts to close. So it's mounted on a slide. An air operated plunger then advances and retracts the chute in timed relation to die motions. Timing is regulated by limit

switches that control motions of the valves of the air cylinder.

One man feeds cups to the loading slide. He also operates press controls when necessary but operation is normally continuous. A second man is stationed beside a stop button at the back of the press, but operates only as a safety man who watches the die and can stop the press if there's any trouble.

A mechanism moved by the press operates transfer arms. These are, of course, positively timed with respect to die motions.

Rectifiers Bid for More Metalworking Jobs

Steel making, arc welding and electroplating share at least one thing in common . . . They all require direct current electricity . . . New types of germanium and selenium rectifiers aim to capture a bigger share of these markets.

And they offer potential users some impressive advantages . . . Compactness, safety, efficiency and flexibility top the list . . . Constant-amperage and constant-voltage types are available in these modern power units.

By Arthur Johnson, Chief Engineer,
Welding Products Div.,
A. O. Smith Corp., Elkhorn, Wis.

A COMPACT, safe, efficient and flexible power unit—the germanium or selenium rectifier—aims to play a major part in supplying direct current electricity to the metalworking industry. Steel mills, arc welding operations and plating shops are among the prime targets.

So are other direct-current applications that did not even exist a few years ago, such as atomic energy plants, magnetic or Faraday pumps, arc furnaces for refining rare metals, and the generation of oxygen and hydrogen by electrolysis.

The new rectifiers offer direct-current users a number of potential advantages: (1) operating economy; (2) safety; (3) up to 99 per cent efficiency in ac-dc conversion; (4) ease of control; (5) compactness; (6) dependability; (7) negligible

maintenance; (8) low noise factor; (9) flexibility in paralleling to match power demands.

The simplicity of these new units is noteworthy. They consist basically of transformers and rectifiers. These prime elements, together with certain protective devices, a simple means of control, a cooling fan and a cabinet enclosure make up the entire assembly.

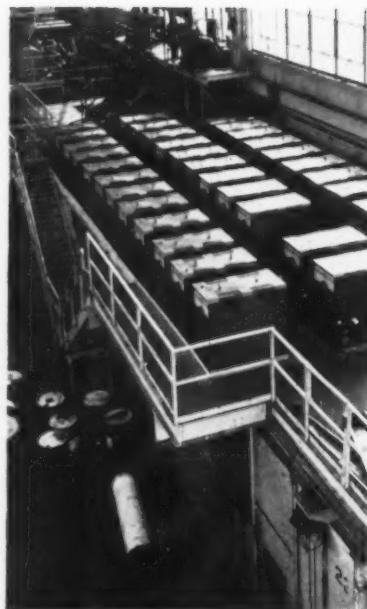
Simple, stepless control

One of the most widely used rectifiers utilizes a 3-phase, silicone-insulated transformer of the leakage-reactance type to provide simple, variable output control. The secondary coil surrounds the primary coil and can be moved up or down by means of an electric motor or a hand crank.

Separating the windings causes less flux to enter the secondary coil, and current output is reduced. Conversely, when the primary coil moves closer to the secondary winding, most of the flux cuts the secondary and the rectifier delivers maximum current.

This arrangement provides stepless output control at any point from minimum to maximum. A large air gap between the primary and secondary coils prevents any possibility of dangerous high voltage passing from the line side into the output bus bars.

After alternating current leaves the transformer it passes to the full-wave rectifier which is made of either selenium or germanium. (Silicon rectifiers also show promise for the future.)



THESE RECTIFIERS supply direct-current power to serve double melting furnaces in an Ohio titanium-producing plant.

Both selenium and germanium have features that make them suitable for particular applications. However, germanium's advantages usually outweigh those of selenium for most jobs.

Selenium's chief virtue is its tremendous overload capacity; selenium stacks have been short-circuited at full amperage for more than 10 minutes without burning out. Because germanium rectifiers are smaller they have limited ability to dissipate heat. This restricts their overload capacities.

Although germanium costs more than selenium initially, it operates at about 99 per cent efficiency and has unlimited life. By comparison, new selenium cells are only about 80 per cent efficient in ac-dc conversion. They also age in service and lose efficiency to the point where they must be replaced.

This difference in operating efficiency and service life can mean considerable savings. For example, assuming a 1250-amp output at 40-v load, input for a selenium rectifier is 77 kw. The same germanium-equipped unit requires only 61 kw input. If power costs 1¢ per kw-hr, the germanium rectifier will save 16¢ per operating hour.

Moreover, on the same rectifier, the cost of replacing selenium stacks, including installation, is 6¢ to 9¢ per hour of use. Such charges are eliminated when germanium is used.

Recover cost fast

Although a 1250-amp germanium rectifier presently costs about \$200 more than a selenium unit, the operating savings make it possible to recover this cost in about 800 hours of operation.

Water-cooled germanium units have other advantages over selenium cells, which are commonly available only in air-cooled types. The germanium cells need no fans or ventilating ducts. With water cooling, ambient temperatures are a minor factor, not a major one as with air-cooled units. Liquid cooled germanium units also occupy less floor space than selenium rectifiers of the same output rating.

Rectifiers using these semi-conductor materials are generally classified either as constant-current or constant-voltage types. Constant-voltage equipment finds use, for example, in furnishing plant power where large numbers of dc motors are used.

But in applications where there is a choice between the two types, constant-current rectifiers are considered safer for both personnel and equipment. It is possible for direct shorts in constant-voltage units to run amperage up to six or seven times rated capacity. This can cause dangerous arcing along with equipment-damaging mechanical and electrical shocks.

Constant amperage units, however, cannot develop these runaway currents. In fact, a direct short will not produce more than twice the rated current, and most equipment will sustain these overloads for short periods. Overload protectors should be provided on all rectifiers, of course.

Constant - amperage equipment also offers infinitely variable output control compared to the step control obtained by changing transformer taps on constant voltage equipment. Moreover, the built-in reactance of constant - current equipment is also an advantage in such operations as arc-furnace melting and gang-welding setups.

These applications require a high open-circuit voltage to strike and maintain a stable arc. This is available in constant-current units. But constant-voltage equipment requires adding auxiliary reactance to the circuit if it is to be used for such service.

When there is a demand for additional power, ac-dc rectifiers can be paralleled to provide almost any

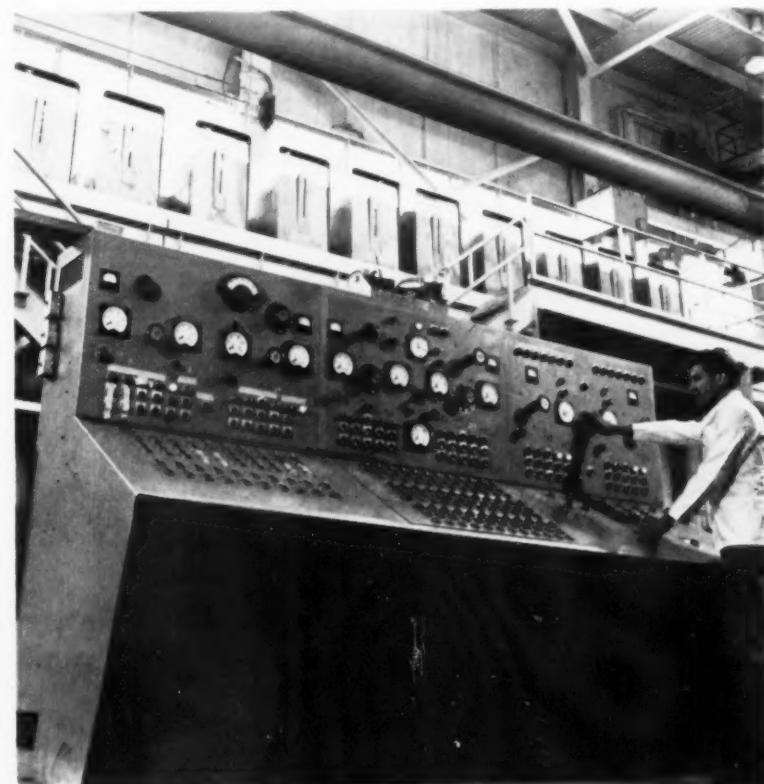
quantity required. Parallel installations with outputs of 10,000 kva are not uncommon, and single units rated in the 750 kva range are being built. Still larger units are entirely feasible.

However, high output voltage at high current values is still a problem. In general, constant-current units are limited to about 250 v, with preferred working ranges below 100 v.

Predict dc boom

Above this range, the problems increase faster than the voltage. However, as more experience is gained in the field, higher output voltages will undoubtedly become available.

Some forecasters predict that the U. S. will add 21 million kw of direct current capacity between now and 1970. This would mean boosting direct current output to 30 per cent of the overall annual power supply. The figure is about 20 per cent at present. Germanium and selenium rectifiers aim for a big share in this growth pattern.



OPERATOR regulates rectifiers shown from this remotely-located, central control panel. Rectifiers are on gallery behind the console panel.

Handles 3-ton loads—

Conveyor "Thinks" Its Way

Through Interfloor Handling

♦ Shuttling parts around in a four-story plant poses two obvious drawbacks to peak production . . . One concerns various delays; the other involves misdirected loads delivered to the wrong floor.

♦ To eliminate these barriers, this plant installed a vertical elevator, linked it with horizontal conveyors at each floor . . . The system virtually "thinks" for itself with its built-in "memory."

♦ THERE'S NO CHANCE for a 6000-lb load of transformer parts to be misrouted between floors at General Electric's Specialty Transformer Dept., Fort Wayne, Ind. A new, automatic, interfloors conveyor setup prevents any pick-up or delivery mixups.

A "memory panel" tells the operator, by means of signal lights, where a load is coming from and where it is to go. Since four floors, nine different conveyor elements and 16 different transfer routings are involved, this does much of the thinking for the single operator who controls the entire system from the first floor.

Designed, built and installed by Gifford-Wood Co. of Hudson, N. Y., the system automates the transfer of raw materials from the building's first floor receiving area to production lines on three upper



OPERATOR on the first floor pushes buttons to operate the automatic conveyor. "Memory" panel is at the left.

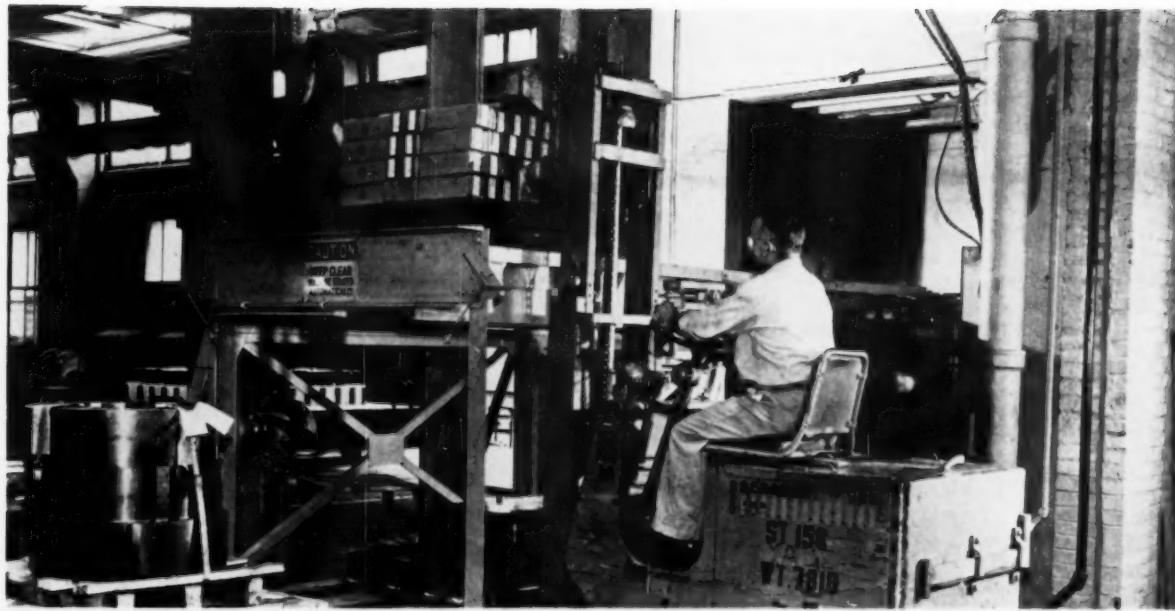
floors. It is also used to move scrap and packaged materials back to the first floor, and to transfer loads between the upper floors.

The complete system is centered around a six-floor vertical conveyor or "gig," which is housed in a special shaft running from the basement to the roof. The levels of horizontal conveyors, one for loading, one for receiving, are installed at each of the floors served

(first, third, fourth and fifth). The gig also contains two levels of chain conveyors that work in conjunction with the dual-level floor conveyors.

Before the new system was installed, all transfer jobs in this plant area were performed by fork trucks and freight elevators.

When GE decided to automate between-floor transfer of materials, one of the chief requirements was to have a conveyor that would



TRUCK operator loads upper level of floor conveyor for transfer to gig. Coils on lower conveyor have just come down from upstairs.

be quick, efficient and simple to operate.

Here are some of the "thinking" and other features built into the new system:

1. *Double-Level Conveying*—The double-level conveyors on each floor completely separate upward and downward transfer operations. A load moving up is automatically transferred from the lower level conveyor at the loading floor into the lower portion of the gig. It is then conveyed vertically to the prescribed floor, and delivered to the lower level conveyor on that floor.

Conversely, loads moving downward are handled on the upper conveyors at feed, vertical transfer and delivery points.

Removes all doubt

This provides a fool-proof operation. There is no confusion about the direction a load will travel. Nor is there any problem of reversing the conveyor system for travel in the opposite direction.

This also enables the conveyor operator to move loads in both directions without having to check receiving points for clearance. The gig can deliver a load to a floor and pick up another load at that floor for travel in the opposite direction. In effect, the two-

way system can operate in both directions almost simultaneously.

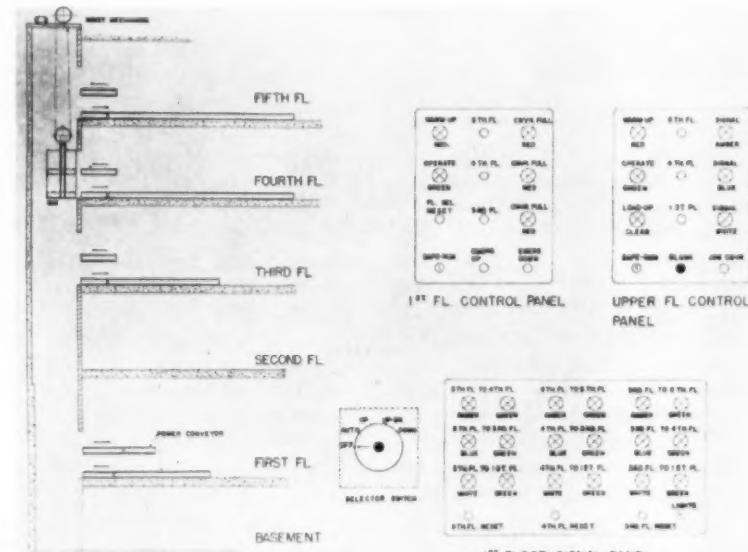
2. *Controlled Versatility*—The detailed control system gives the plant five different conveying cycles with one conveyor.

Cycle No. 1 is "Full Automatic," for moving a series of pallets from one loading point to a single delivery point. In this case the

operator simply makes an initial cycle setting on the main control panel.

Cycle No. 2, "Up Only," delivers a single load to a designated floor. In this case, the operator cycles each load from the panel.

Cycle No. 3 is "Up-Down," which automatically carries a pallet to a specified floor and brings



GIG can load and unload simultaneously, serves four floors (left). Control panels and signal switches at various floors insure accuracy in any of 16 different transfer routings.

**Numerous safety devices are important features . . .
They're installed at every point in the conveyor
system where a transfer mishap might occur.**

down another pallet from the same floor.

Cycle No. 4, "Down Only," sends the empty gig up to a specified floor, where it picks up a load and returns.

Cycle No. 5 is for manual operation of the gig, and is used for service and maintenance operations.

3. *The "Memory Panel"*—Obviously, this conveyor system is a thorough but somewhat complex operation, with pallets moving between any of four floors in either up or down directions. But the "memory panel" at the first floor main operating station tells the operator both the origin and destination of any load.

When someone on one of the upper floors has a load to transfer, he presses a button on the control panel located on his floor. This flashes a light on the first floor main panel, which tells the first floor operator the pickup point. As soon as the load moves into the gig, its destination is flashed on another light on the first floor panel.

Telephones come next

As a further communications refinement, GE is installing an inter-floor telephone system between all of the control panels for the system.

4. *Heavy-Duty Conveying* — The 6000 lb load capacity designed into the system is more than ample for the materials handled. The only restriction on loads is their pallet size, since the conveyors will handle 40 in. x 48 in. pallets with room for 8 in. of overhang on the sides. All of the plant's own pallets conform to this size. Any incoming shipments on different size pallets are loaded onto standard pallets before any transfer operations are begun.

5. *Safety Features*—Safety devices are installed at every point in the system where a transfer mishap might occur. For example, oversize pallet detectors surround each feed conveyor. They prevent

loading of overloaded or badly stacked pallets into the gig.

These detectors are made of heavy-duty wire that travels up one side, over the top and down the other side of the conveyor. If any pallets are loaded more than 8 in. in excess of their established 40 in. width and 46 in. height, they strike this wire. This sets off a switch that stops the entire conveyor system.

Use electric eye, too

An electric eye at the first floor horizontal conveyor stops and starts this unit for loading and unloading operations. When a fork truck approaches the conveyor with a load, the truck breaks the electronic beam and the moving conveyor stops. After positioning the load the truck backs off from the conveyor. This restores the beam, and the conveyor moves the load into the gig.

On the upper floors a series of signal lights and alarm bells notify the truck operator on that floor that a load is approaching for pick-up. These alarms are set off by switches in the conveyor shaft that make contact with the approaching gig.

Safe-run switches and main power disconnect switches are installed on each floor to cut off the entire system in case of accident, and for maintenance. Slack-cable limit switches protect the gig against cable accidents.

Here are the main steps in moving a load from the first floor to any of the upper floors:

1. The first floor operator sets the cycle selector switch on the main control panel.

2. He then sets another switch for the load destination.

3. He moves the load by fork truck onto the first floor horizontal conveyor and then backs the truck away. This starts the load moving toward the gig.

4. As the load approaches the gig doors, a limit switch stops the horizontal conveyor and simultaneously brings the gig down

from its "neutral" storage position on the second floor, where the system is not used.

5. Downward movement of the vertical conveyor opens a set of fire doors at the first floor. A switch in the vertical shaft then cuts off the main gig motor and starts a leveling motor.

6. When the gig is at correct floor level, a switch shuts off the leveling motor and starts both the horizontal floor conveyor and the conveyor inside the gig. The pallet then moves into the gig. A switch at the rear of the gig then stops both the feed conveyor and the floor conveyor in the gig. It also starts the gig upward and closes the fire doors. The gig moves at 60 fpm.

7. At the receiving floor the ascending gig causes the fire doors to open. The gig levels itself and transfers the pallet to the receiving conveyor on the floor outside.

8. As it travels on this conveyor the pallet strikes another switch. This stops the low-level conveyor inside the gig, starts the gig downward and also closes the fire doors.

9. As the floor conveyor receives additional loads it moves each one forward one pallet length. The conveyor can hold several loads before truck pick-up is necessary.

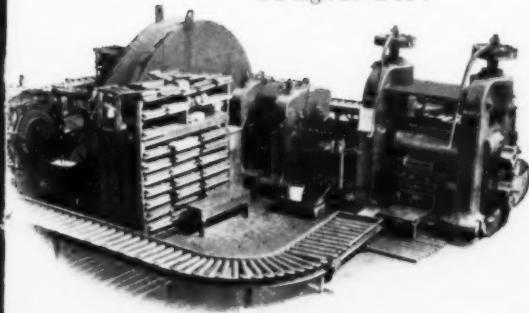
When the first load reaches the end of the conveyor, it contacts a signal switch. This notifies the operator on the first floor to stop deliveries to this station until the conveyor is unloaded. It also electrically prevents the system from operating to that floor until previous pallets are removed.

When pallets are moved downward from one floor to another, the transfer sequence is reversed. Conveyors, doors, and control features are again interlocked throughout the entire sequence.

The complete system uses 17 totally enclosed GE gearmotors, all with disk brakes. For efficient maintenance, all control wiring is centered in the main control panel on the first floor. The system's horizontal conveyors are all three-chain units, supported by steel channels. They move at 40 fpm.

BEFORE

Falco's #5 mill, as it looked before modernization. It is a 2-high 20" x 44".



AT FAIRMONT ALUMINUM

Same mills... big differences

Without running any faster,
this line of cold mills has
20% greater capacity,
thanks to BLISS modernization

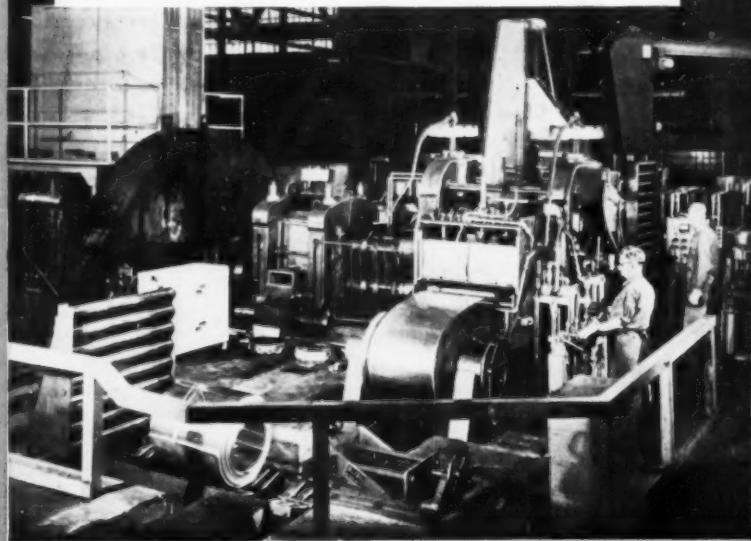
RESULTS

Here's what Fairmont Aluminum reports about its Bliss-modernized mills:

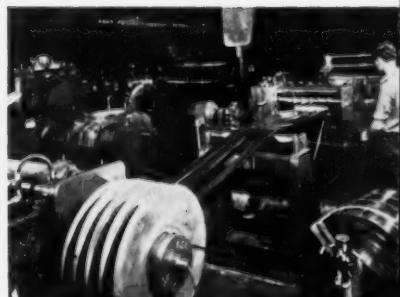
- Output is up 20% and will go higher as the plant completes other installations, such as new annealing facilities.
- Coil handling is far easier. Surface damage to the strip has been eliminated. And finish has been improved by the new roll-coolant systems ... Fairmont Aluminum formerly dry rolled.
- Thanks to the new Bliss tension reels, reduction per pass on each mill has been increased 12% or more. Former maximum was 20%.

AFTER

The same mill, as it looks today. The entry and delivery equipment has been replaced with Bliss cone-type payoff reel, tension reel, bridle unit, belt wrapper, coil buggies and upenders. The strip is accurately centered in the work rolls, and it is a simple matter to hold gage, always a problem with the old equipment. This mill is used for secondary breakdown, rolling strip in thicknesses between 0.125" and .025" and in widths to 38". Similar Bliss equipment was also added to Mill #6, used for secondary breakdown and finishing of narrower strip. Another improvement involves new motorized screwdowns presently being manufactured by Bliss.



Mill #7 is a 16" x 30" used for finishing to gages as thin as .006". It has a Bliss mandrel-type payoff (shown here), bridle feed, tension reel and roll-coolant system.



New 28" Bliss slitting line takes up to 12 cuts in 0.020" material at speeds up to 600 fpm. Bliss also revamped the plant's 36" slitting line, equipping it with tension reel, mandrel-type payoff and coil buggy.

If you are contemplating improvements or modernization, it will pay you to consult Bliss Rolling Mill Division engineers. For details of typical Bliss installations, write today for a copy of the 60-page Bliss Rolling Mill Brochure, Catalog 40-A. It's yours for the asking.

BLISS
SINCE 1857

E. W. BLISS COMPANY
General Office: Canton, Ohio
ROLLING MILL DIVISION, Salem, Ohio

*is more than a name...
it's a guarantee*

PLANTS: Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; Pittsburgh and Midland, Pennsylvania; San Jose, California. In Europe: E. W. Bliss (England) Ltd., Derby; E. W. Bliss Co., (Paris), France.

New Technical Literature:

Catalogs and Bulletins

Resistance welding

"Resistance Welding At Work" features the application of resistance welding techniques to fabricate the primary structures of air conditioning units of the York Div. of Borg-Warner. Costs for the complex chassis assembly have been cut 34.5-pct and 60.9-pct for the multi-part wrapper assembly, it states. Six standard welders, a two gun portable unit, and a wrapper machine are used to assemble the complex air conditioner chassis on an assembly line basis for the $\frac{1}{2}$, $\frac{3}{4}$, and one ton size air conditioners. *Sciaky Bros., Inc.*

For free copy circle No. 1 on postcard p. 81

Casting cleaning

Low cost cleaning of castings in a blast room with high visibility, achieved through efficient down-draft ventilation, is described in a leaflet. A patented waffle-type floor permits rapid removal of abrasive from the room. The abrasive is removed from the blast room by the air that ventilates the room, is completely air washed and is returned to the continuous blast generator in a closed system. High visibility is described as a means of increasing worker output, thus lowering costs. *Vacu-Blast Co., Inc.*

For free copy circle No. 2 on postcard p. 81

Flexible couplings

Flexible couplings are covered in a new 8-page catalog. It contains descriptive information, engineering data, horsepower ratings, parts lists and prices. Space is devoted to couplings embodying all steel construction that renders long life expectancy, not possible by use of non-steel design. Connecting two revolving shafts together, they absorb shock loads and provide high flexibility with little back lash. *Acme Chain Corp.*

For free copy circle No. 3 on postcard p. 81

Truck couplers

Couplers used on a line of power industrial trucks are pictured in a new engineering bulletin. It covers the pin type, which can be had in various dimensions and sizes according to specific requirements; the double height pin type which permits two coupler heights; the automatic coupler which can be adapted for hand or foot operation; the remote control pin type which permits hand or foot operation from the driver's seat; the U-bolt type and the pin type with chain which may also be operated from the driver's seat. *The Elwell-Parker Electric Co.*

For free copy circle No. 7 on postcard p. 81

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 81.

Silicone rubber fabric

Silicone rubber coated fabrics and nylon resin coated nylon fabrics are discussed in a four-page bulletin now available. It lists many stock and standard fabric constructions, discusses briefly properties, applications, base fabrics and coatings. It serves as a background on both standard and special coated fabric constructions. *Connecticut Hard Rubber Co.*

For free copy circle No. 4 on postcard p. 81

Phenolic products

Phenolic molding materials and resins are described in an illustrated brochure. The 12-page catalog includes detailed technical data, special properties and product features of phenolic molding powders, rubber phenolic molding powders, phenolic laminating varnishes, and industrial and foundry resins. *General Electric Chemical Materials Dept.*

For free copy circle No. 5 on postcard p. 81

Steel shelving

How to plan storage areas efficiently by using a particular steel corporation's storage engineering service is featured in a new 36-page catalog of steel shelving. It lists a line of convertible steel shelving with several new construction features. A special section offers the assistance of the firm's trained staff of storage engineers to industries with storage problems. *Republic Steel Corp.*

For free copy circle No. 6 on postcard p. 81

Teflon equipment

Equipment of Teflon tetrafluoroethylene is depicted in a presently obtainable four-page bulletin. It covers this du Pont plastic resin as a material. The brochure details Teflon's properties: inertness to chemicals, dielectric properties, resistance to a wide range of temperatures, low friction characteristics, and weather resistance. The products include thin-and-heavy-walled tubing and rod, steel pipe lining, insulated wire, machine parts, and sheet. All the materials are manufactured from Teflon tetrafluoroethylene, a product and development of E. I. du Pont de Nemours & Co. *Halocarbon Div., Haver Industries, Inc.*

For free copy circle No. 8 on postcard p. 81

Presses

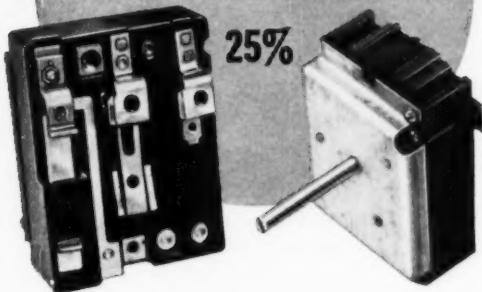
Latest developments in one firm's line of automatic multiple transfer presses and their basic principles of operation are explained in a comprehensive bulletin. The multiple transfer press is widely used in mass production of small parts. A high degree of automation, coupled with speed and ability to maintain close tolerances with minimum down-time, are claimed as features of this type of press. The bulletin describes and gives full details of tooling and production rates on a number of typical jobs applicable to machines of this type, as well as detailed specifications on the eight basic sizes of presses available. *The Baird Machine Co.*

For free copy circle No. 9 on postcard p. 81

Designed
with...

Beryllium Copper

SIZE OF PROCTOR ELECTRIC'S RANGE-SWITCH IS REDUCED



In its line of fast heating range controls, Proctor specifies the beryllium copper alloy designated Berylco #10, supplied by The Beryllium Corporation, Reading, Penna. Proctor has discovered in this alloy a particularly ideal combination of physical properties—high fatigue strength, good resilience for spring uses, and excellent electrical conductivity for parts carrying current.

PROPERTIES OF "BERYLCO" 10 STRIP ($\frac{1}{2}$ hard temper, heat treated)

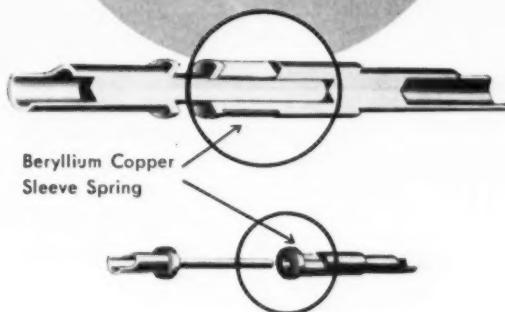
Tensile Strength	110,000 psi (minimum)
% Elongation in 2 in.	5 (minimum)
Rockwell Hardness	
B Scale	95 (minimum)
30T Scale	79 (minimum)
Electrical Conductivity	
% IACS	48 (minimum)
Elastic Modulus in Tension (20°C)	
Before heat treatment	16,000,000 psi
After heat treatment	18,000,000 psi
Elastic Modulus in Torsion (20°C)	
Before heat treatment	6,000,000 psi
After heat treatment	6,800,000 psi

The high tensile strength of beryllium copper eliminates the need for bulky and complicated forms in these parts, thereby permitting a 25% reduction in the unit's size over former models. While the beryllium copper parts constitute only 20% of the weight of the materials employed in the completed range-switch, they are rated 85% in importance by the manufacturer.

In addition to special test requirements of range manufacturers, each switch passes 300 quality control tests at Proctor. In a "mechanical abuse" test, for example, the control shaft is rotated 20,000 times, after which the unit must still operate and maintain its calibration within $\pm 2\%$.

A technical bulletin (#37), with more specific details on the design and use of beryllium copper for Proctor electric range-switches, is available without charge upon request to The Beryllium Corporation, Reading, Penna.

SLEEVE SPRING IN CANNON PLUG PRESSURES FOR MAXIMUM CURRENT FLOW



The sleeve spring in a Cannon multi-contact electrical connector forces the pin of the plug tightly against the socket wall to assure maximum consistent current flow. The fatigue strength of the metal used in the spring governs the efficiency and life expectancy of the entire connector. The spring metal must be corrosion resistant, since corrosion would weaken the metal, shortening the life of the spring, and cause wear on the pin of the plug.



In laboratory tests, engaging and separation forces were measured on both beryllium copper and phosphor bronze socket springs when subjected to bending torque from a special test prod. The separation force values after distortion were much lower for the phosphor bronze springs than for the beryllium copper springs. In fact, the phosphor bronze springs failed a number of times, but the beryllium copper springs, made of Berylco #25 alloy, provided consistent pressure even after having been split wide open.



Cannon Electric formerly used phosphor bronze as the spring metal until it conducted tests with beryllium copper. Now Cannon expects to make beryllium copper the standard "napkin ring" metal on all of its connectors.



A technical bulletin (#34) is available without cost from The Beryllium Corporation, Reading, Penna. It describes in detail the numerous tests used by Cannon Electric in evaluating beryllium copper as a material for the sleeve springs of its multi-contact connectors.

from tea strainers...



to catalytic crackers...

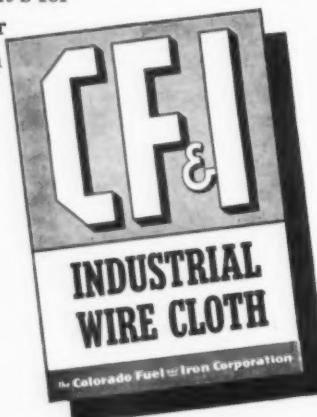
you will find



INDUSTRIAL WIRE CLOTH

It's a versatile product, this CF&I Industrial Wire Cloth. For it plays an essential part in the tiny tea strainer and in the oil refinery's huge catalytic cracker. Chances are that you're using it—or could be using it—to good advantage right in your own operations.

CF&I Industrial Wire Cloth will meet your most exacting specifications—whether it's for screening, filtering, grading, cleaning or processing. That's because CF&I Cloth comes in a wide variety of weaves and meshes and can be supplied in non-ferrous metals, as well as carbon and alloy steels. Why not get the complete details from your nearby CF&I representative today?



THE COLORADO FUEL AND IRON CORPORATION: Albuquerque • Amarillo • Billings • Boise • Butte Casper • Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Los Angeles • Oakland Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Antonio • San Francisco • Seattle Spokane • Wichita • WICKWIRE SPENCER STEEL DIVISION: Atlanta • Boston • Buffalo • Chicago Detroit • New Orleans • New York • Philadelphia • CF&I OFFICES IN CANADA: Montreal • Toronto

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3675

FREE TECHNICAL LITERATURE

Plating rectifier

A new bulletin describes an air-cooled germanium plating rectifier. The rectifier features a unique cooling system design, finger-tip remote control and automatic voltage stabilization in ratings from 6 to 24-v and 750 to 12,000-amp. *General Electric Co.*

For free copy circle No. 10 on postcard p. 81

Synthetic rubber

Facts about Hypalon synthetic rubber are contained in a publication for maintenance, operating, and design engineers. This issue covers the material's weather resistance, its usage as lining for acid hose, and an acid test of it as a lining material. *Elastomers Div., E. I. du Pont de Nemours & Co.*

For free copy circle No. 11 on postcard p. 81

Stainless castings

In its second edition, a 28-page booklet gives information on corrosion-and-heat resisting stainless steel castings. It has a special technical data section which gives physical properties and chemical composition-standard analysis on stainless steels used in casting. *Allegheny Ludlum Steel Corp.*

For free copy circle No. 12 on postcard p. 81

Marking head

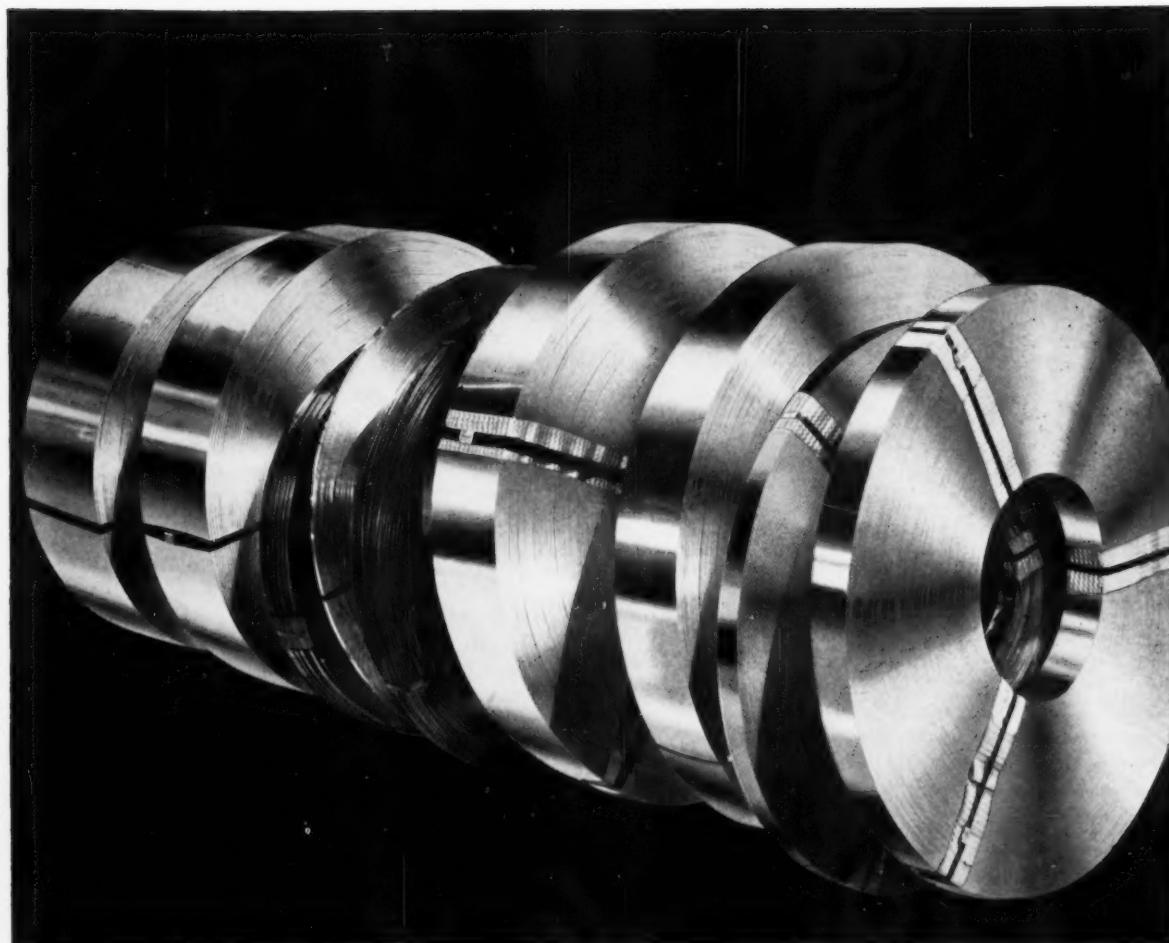
Newly designed, a marking head for single-stroke Pneumatic markers is announced in new literature. The new marking head incorporates a fast-change magazine style typeholder that allows users to change entire type set-ups quickly, easily, and safely. The type magazine is made to accommodate lines of interchangeable characters positioned per your specifications. *The Pannier Corp.*

For free copy circle No. 13 on postcard p. 81

Steel springs

Hot and cold-wound steel spring production is analyzed in a 16-page publication now available. It describes a firm's more than 80 years experience in its spring producing plant at Latrobe, Pa. and later with the addition of a second one at Chicago Heights, Ill. *ALCO Products, Inc.*

For free copy circle No. 14 on postcard p. 81



it's CRUCIBLE
for the widest assortment
of cold rolled specialty steels

Crucible has the largest assortment of cold rolled specialty steels you'll find anywhere. And delivery is dependable—in the size, grade, gauge, or analysis you want.

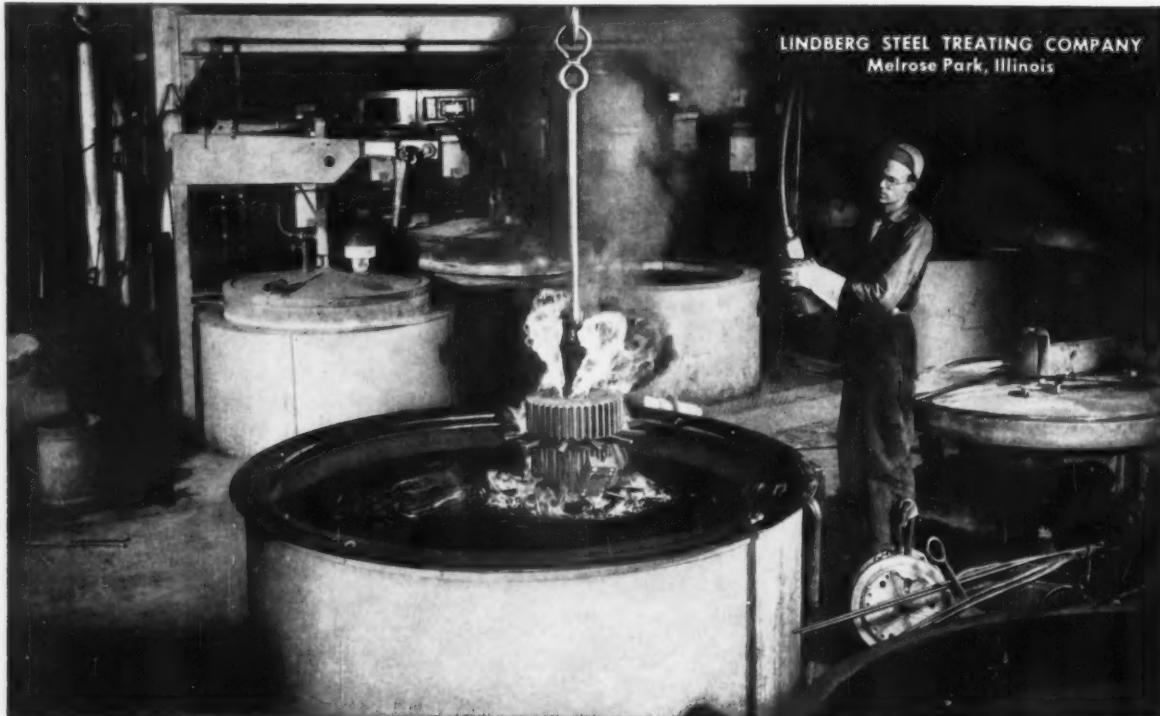
What's more, Crucible's steelmaking experience—its improved mill facilities—combine to bring you cold rolled steels of optimum uniformity... finer finish... better edges... flatter strip.

No need to shop around—call Crucible for carbon spring steel, alloy strip steel, or *any* ferrous analysis that can be cold rolled. For more information, write now for your copy of the 32-page booklet, "Cold Rolled Specialty Steels". *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

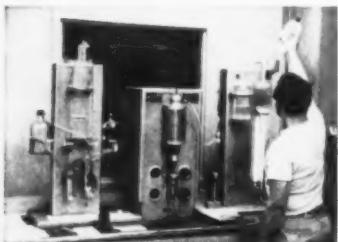
CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America



For machine shop tolerances— Lindberg uses Cities Service Quenching Oil



Lindberg's Lab stringently tests treated metals. Dimensional changes from poor quenching oil would quickly show up here. But Cities Service Quenching Oil cools metal with no significant dimensional change.



Some of Lindberg's Furnaces. Here, they heat-treat all kinds of steel products . . . bolts, washers, gear blanks, saw blade segments, etc. Steel for bars of Illinois State Penitentiary was one of their first jobs.

At Lindberg Steel Treating Company a routine order might include a dozen shafts, stamping and forming dies, jigs and fixtures and even production parts. But though the products might differ, most would carry the same stipulation—heat treat with very low dimensional change.

To some heat treating operations this might present a problem, but not to Lindberg. By the use of Cities Service Quenching Oil, they're able to cool their steel with no significant changes in dimension.

"In addition," say Lindberg metallurgists, "we like Cities Service Quenching Oil because it has high flash point, consistent viscosity, excellent oxidation resistance, and a stable cooling rate."

Anyone looking for a better quenching oil would do well to try this superior Cities Service oil. For further information, talk with your local Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

THE IRON AGE

FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on p. 76.

Tube furnace

Graphite tube furnaces for temperatures to 5000°F. are dealt with in a data sheet just prepared. The illustrated bulletin mentions operating limitations of graphite tubular element research and production furnaces. It describes the auxiliary and control equipment normally used. Also included is a table of specifications and dimensions of 17 standard models now available. Several models are illustrated. *Harper Electric Furnace Co.*

For free copy circle No. 15 on postcard

Anti air-pollution

Guaranteed to remove all visible smoke and virtually all odor, a new electrical smoke precipitator is described in a folder now available. This smoke breaker requires no special power plant, requires little installation space, and can be worked by a single operator. It does not use the after-burner principle technique, the literature emphasizes. Rather, it eliminates the visible smoke entirely. *Summer & Co.*

For free copy circle No. 16 on postcard

Oscillograph

A recording oscillograph is presented in a now obtainable brochure and data sheet. It describes this unit as bringing modern instrumentation into the plant at a low cost for accurate static-dynamic data recording. This photographic-type oscillograph offers precision recording of six data traces at frequencies from 0 to 300 cycles per second. *Consolidated Electrodynamics Corp.*

For free copy circle No. 17 on postcard

Radioisotopes

Radiation for research is covered in an 8-page brochure. It explains a company's nuclear system's division and how it makes available to customers any type of radioactive source fabricated in any shape, containing any radioisotope normally available from the Atomic Energy Commission. Also reviewed are services, custom instrumentation installations and associated shielding and exposure equipment. Several photographs show the set-ups in use. *Nuclear Systems Div., The Budd Co.*

For free copy circle No. 18 on postcard

Nylon materials

Rod, strip, plate, tubing and tubular bars of nylon are dealt with in a 16-page booklet. It presents the product's advantages as: light, tough, resilient, abrasion and heat-resistant, good insulator and resistance to most chemicals. Methods of producing nylon parts, fabricating techniques, special design considerations and special nylons are discussed. It includes a section explaining when fabricating is the best answer for nylon parts. Several charts and illustrations are included. *The Polymer Corp. of Pennsylvania.*

For free copy circle No. 19 on postcard

Cold headed fasteners

New 4-page catalog covers the design and manufacturing advantages of cold headed fasteners and parts. Text and illustrations show the infinite design possibilities in rivet, nail and threaded part manufacture by the cold heading or cold forging process. *John Hassall, Inc.*

For free copy circle No. 20 on postcard

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 1/10/57

Circle numbers for Free Technical Literature or Information on New Equipment:

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Your Name

Title

Company

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THE IRON AGE
Post Office Box 77
Village Station
NEW YORK 14, N. Y.

FREE TECHNICAL LITERATURE

Hydro presses

Four-column, down-acting hydraulic presses are shown in a brochure. These 25 to 300-ton presses offer variable pressure, adjustable stroke, a wide range of speeds, adjustable daylight, fast traverse with slow pressing, and manual, semi-manual and full-automatic controls. *K. R. Wilson, Inc.*

For free copy circle No. 21 on postcard

Rolling mills

Rolling mills and auxiliary equipment are listed in a presently obtainable catalog. Contained are pictures and descriptions of rolling mills (strip, rod, special mills, gang slitters, draw benches), auxiliary equipment (for strip, rod and wire, tube mills), and reference tables. *Waterbury Farrel Foundry & Machine Co.*

For free copy circle No. 25 on postcard

Metal sawing

Completely revised, a 36-page edition of a popular metal sawing handbook covers proper selection and use of hand and power hack saw blades and band saw blades. Selection of the correct blade for any job is simplified by charts. Recommended cutting speeds, feeds and techniques are also tabulated. Common metal cutting problems and their preferred solutions are a feature of this edition. *W. O. Barnes Co., Inc.*

For free copy circle No. 22 on postcard

Scrap handling

Scrap your scrap handling problems. That's the suggestion of a folder now available. It suggests that this can be accomplished with the acquisition of a new crane. Pictured and explained are several cranes on crawler treads and rubber tire mountings. These range from 8 to 28½-ton units for the crawlers, 15 to 30-ton on the latter type. They come in $\frac{1}{2}$ to $1\frac{1}{2}$ -cu yd capacities (bucket sizes are variable). *Bay City Shovels, Inc.*

For free copy circle No. 26 on postcard

Bit, rod equipment

Bit and rod shop equipment for fast and economical bit and steel reconditioning is a requirement wherever large scale rock drilling operations are carried on. One company offers a complete line of jackbit grinders for small and large carset bits and small steel bits. Drill steel and bit furnaces for heating to forging temperature and for tempering are part of the blacksmith equipment offered. Drill steel sharpeners, steel cutter and shank grinders round out the line. A four page booklet reviews this equipment. *Ingersoll-Rand.*

For free copy circle No. 23 on postcard

Castings

Close tolerance steel castings at low cost are presented in a four-page bulletin. It explains a new casting process. This utilizes ceramic molds which impart desirable characteristics to finished castings. These, it states, include: surface smoothness, dimensional accuracy and freedom from sand or gas inclusions. Its cost and quality advantages are thoroughly discussed. *Lebanon Steel Foundry.*

For free copy circle No. 27 on postcard

Heaters

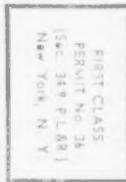
A new vest-pocket heater handbook contains specifications and operating characteristics as well as installation and application data. The 64-page handbook is a handy source of unit heater information for on-the-job calculations or conferences. Included are: capacity tables, dimensions, engineering specifications, external ductwork suggestions, mounting heights, piping diagrams, pipe sizes, sound ratings and wiring diagrams. *American Blower Corp.*

For free copy circle No. 28 on postcard

THE IRON AGE
Post Office Box 77
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BUSINESS REPLY CARD
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If you want more details on products advertised in this issue fill in below:

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Carbide grinding

Carbide tool and chip breaker grinders are depicted in a currently available 16-page booklet. Several of the machines illustrated are new. Covered are electrolytic grinding, diamond finishing grinders (medium and heavy-duty), wet or dry carbide tool grinders, dry carbide tool grinders and solid carbide insert grinding fixtures. *Hammond Machinery Builders, Inc.*

For free copy circle No. 24 on postcard

TODAY!



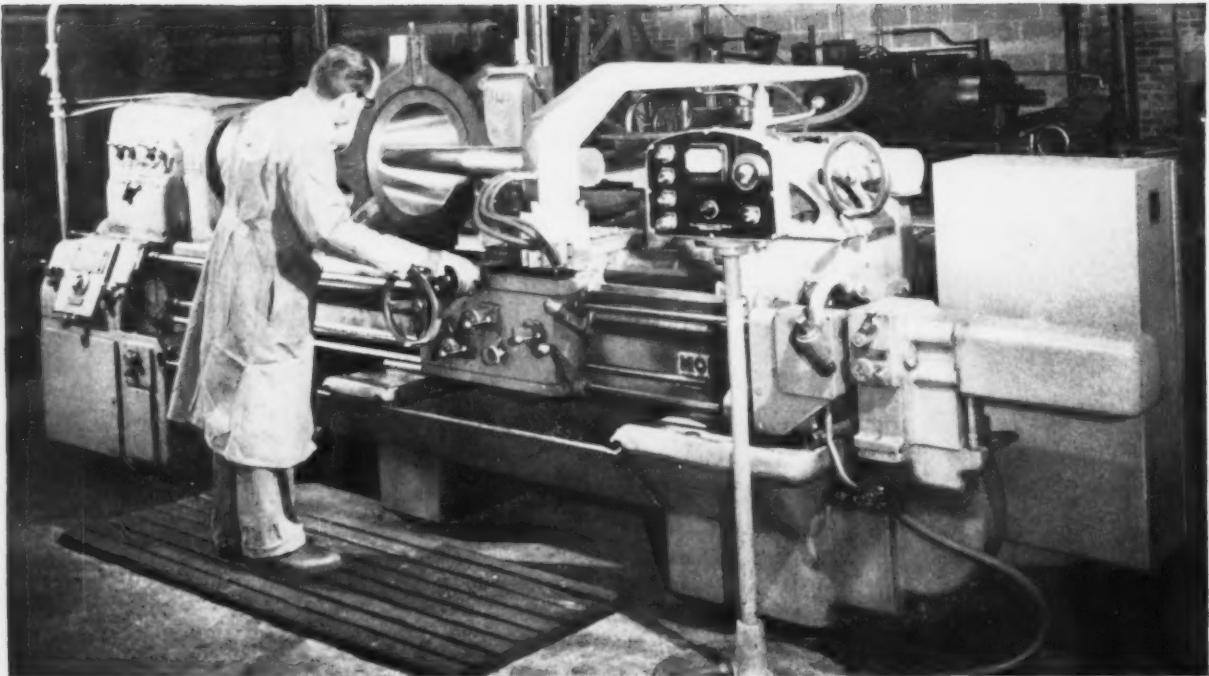
**FROM PROGRESSIVE...
CUSTOMIZED SEMS FASTENERS**

Now you can get from PROGRESSIVE Sems Fasteners with an extra customized touch — Sems Fasteners which are custom-made to your order. This means: (1) specifically made for you — not bin stock parts; (2) fast, custom-handling of every order; *plus* (3) the double economy of low initial cost *and* the savings in your assembly operations possible only with high precision, torsion-tested fasteners.

STANDARDS AND SPECIALS CUSTOMIZED FOR YOUR NEEDS

THE PROGRESSIVE MFG. CO.

Division of The Torrington Company
70 Norwood Street, Torrington, Connecticut



A Monarch 20" Series 61 Swiveling "Air-Gage Tracer" Lathe contour boring a jet cone to a depth of $31\frac{1}{2}$ ". The I. D. starts at approximately $18\frac{1}{2}$ " and decreases to approximately 4". The contour of the I. D. has a radius and blend tapers. Material is the tough super-alloy called A-286, one of the toughest of all the new super-alloys to machine. "Some jobs", says Diversey's president, "can only be done on Monarch swiveling-type tracer lathes".



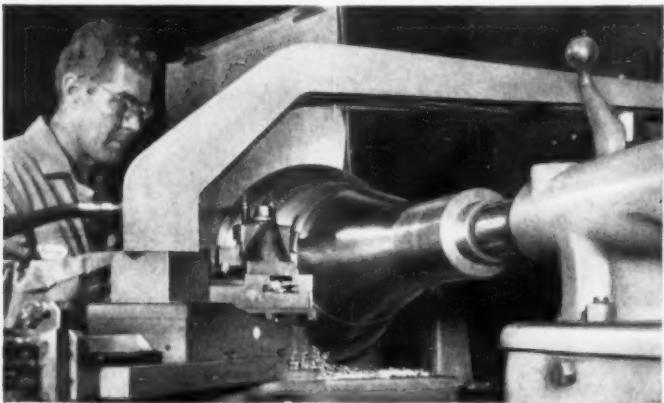
Hitch up the talents of DIVERSEY ENGINEERING COMPANY, Franklin Park, Illinois and their tracer-controlled Monarch lathes, and you get one of the most important production teams in our jet engine and guided missile programs.

Starting with one Monarch lathe seven years ago, Diversey is now the largest in the country specializing in these components. Fifteen lathes—an exclusively Monarch installation—are now in practically around-the-clock use. All but two are tracer-controlled. Latest is a 48" swing swiveling Air-Gage Tracer type machine, the capacity of which places Diversey in the position of being one of the few companies in the United States with the equipment and know-how to handle machining on some of the large, new guided missile contoured parts.

Monarch's tracer controlled lathes are more than the Secret Weapon's secret weapon—they're everybody's weapon for better production. Yours too! Ask for Booklet #2608—or a sales engineer . . . The Monarch Machine Tool Company, Sidney, Ohio.



The same Series 61 turns the same jet cone, described on opposite page. This operation uses practically the full swing capacity of the lathe.



"GUIDED" LATHES for Guided Missiles

Contour Turning of "Super-alloys" Made Easy



A Monarch 20" Model M "Air-Gage Tracer" Lathe finish machines the center bulkhead of a guided missile to 63RMS. Material is heat-treated hi-nickel alloy. In the foreground of above illustration is a number of completed bulkheads while toward the tail end of the machine are some nose cones for a missile head. These are also turned on the 20" Model M. Smaller view (above right) shows clearly the unusual finish imparted.

Monarch
TURNING MACHINES

FOR A BETTER TURN FASTER
... TURN TO MONARCH

**It's Not The
TOOT
That Runs
The Train**

Frank Sorenson Jr.

TREASURER, THE CINCINNATI GEAR CO.

Did you ever get a tune lodged in the back of your head, and not be able to get it out? I happened to hear a catchy children's record awhile ago that keeps popping up in my mind; I'm a little fuzzy on the exact details but the gist of the lyrics is that "it's not the toot that runs the train, but the chug chug chug." Even though the song was obviously written to appeal to young children, the simple logic of its message is just as important to us grown-ups. Because it is all too easy to lose track of basic objectives in the normal rush of competitive business and the manufacture of a competitive product. To cut a nickel here or there off the "toot" to meet competition is one thing; but if a dime or two also gets cut off the "chug chug chug" for the same reason, it may *show up* for the first time when the product is in the consumer's hands — with lasting adverse effects. Any such quality lapse in the important O.E. products into which many of our custom gears go would be a serious matter for the manufacturer. Our clients know this, and they know that a gear can be a crucial part in their product — and that's why they come to us. They have found from experience that we make their custom gear costs *inexpensive* by giving them the *quality and service* they require. We'll do the same for your firm, if given the opportunity.

THE CINCINNATI GEAR CO.
CINCINNATI 27, OHIO

Fifty Years of "Gears—Good Gears Only"



You Arbitrate It!

THE LOST WEEKEND

From the Files of the American Arbitration Association

After a big night drinking with some of the boys, Bill G. came into work Tuesday morning bleary-eyed and out of sorts. The only thing that kept him going was the thought of Friday, which was one of the eight paid holidays provided for in the union contract.

As the day wore on, it became more and more difficult for him to keep his eyes open. So when he thought the coast was clear, he slipped off into the tool crib to catch forty winks. The first thing he knew, he was being rudely awakened by the foreman, who then marched him off to the personnel office where he got a two-day suspension. He was told not to come back to work till Monday.

Bill didn't complain about the suspension. That was fair enough, he thought. But he was mad as a boil when he found out he wasn't going to get his holiday pay for Friday. "What's the idea?" he demanded to know. "I wasn't fired. I was only suspended for two days, Wednesday and Thursday.

Friday was a paid holiday and by that time I was in good standing again, so why don't I get paid for the holiday?"

"Not so fast," said the personnel director. "It says in the union contract that holiday pay shall be given only to employees who work the day before and the day after the holiday. You were out on suspension the day before, so you don't get paid."

No Stretching Allowed

Bill got no satisfaction as the case went through the grievance procedure. Finally, it went to arbitration where the company argued that it was the business of a worker to conduct himself in such a way as not to invoke disciplinary lay-offs. If a man slept on a job and got suspended, it was his own fault, and his absence should count against him. The union countered that the contract clause requiring a man to work the day before and after the holiday was merely intended to prevent employees from "stretching" a holiday, and that absences ordered by management should not be held against the employee. You arbitrate it; how would YOU rule?

(Arbitrator's award on facing page.)

New Books:

"Operations Research, A Basic Approach," discusses the subject without excessive dependence on mathematical formulas. It attempts to give the typical operating executive a good introduction to the matter. The report avoids almost inevitable complications by showing what has actually been accomplished by operations research, while avoiding most of the formulae and jargon. 111 pp. \$3.75 per copy. American Management Assn., 1515 Broadway, New York 36.

"An Encyclopedia of the Iron & Steel Industry," by A. K. Osborne, is a true reference book compiled by A. K. Osborne, A.Met., technical librarian and information officer of the Brown-Firth research laboratories, Sheffield, England. It provides a concise description of the materials, plant, tools and processes of the iron and steel industry, and those closely allied to it. It is not a text-book. 558 pp. \$25 per copy. Philosophical Library, Inc., 15 E. 40th St., New York 16.

"Radioisotopes, The Wonder Tool," is a non-technical sourcebook on the practical uses of radioisotopes in industry. It makes a natural attempt to bring between two covers the uses, techniques and applications of a mushrooming field. 92 pp. Many tables, listings. \$7.50 per copy. The Atomic Energy Guideletter, 1420 New York Ave., N. W., Washington 5, D. C.

The Arbitrator Said:

Here is how the ARBITRATOR ruled. The arbitrator upheld the union's argument. He noted that the contract provided exceptions to the rule about working the day before and after the holiday, in the case of verified sickness, death in the family, or other "good cause." From this he inferred that the purpose of the parties in writing the contract the way they did was to exclude from holiday pay only those who took the time off because of a "mere desire or free choice on the part of the employee for more pleasure and enjoyment." Since Bill G. had not wanted Thursday off, the company was ordered to pay him for the holiday.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony and other facts involved.



Here's the perfect answer to your questions on non-ferrous alloys. The well illustrated Riverside products handbook contains a complete listing of the composition and physical properties of the top-quality phosphor bronze, nickel silver and other non-ferrous alloys Riverside makes.

If you use or fabricate metal parts, you'll want to keep this informative book on hand for ready consultation.

Mail coupon today for your free copy!

RIVERSIDE METAL DIVISION, H. K. PORTER COMPANY, INC.
Riverside, New Jersey

Please send me my free copy of your new handbook, "Riverside Alloys."

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CITY ZONE STATE

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H. K. PORTER COMPANY, INC.



VULCAN Tool Steels get results:

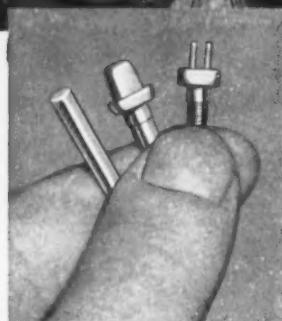
Production up, costs down

A major tool steel user—H. M. Harper Company—recently came up with a real “toughy”: Dies for cold heading slotted, hard-to-work Nickel terminal screws. Harper tested steels of various analyses for the application. They found that Vulcan Special Vanadium filled the requirements exactly.

The result—terminal screws produced by cold heading process instead of milling—at very substantial increases in production and much lower cost.

Vulcan representatives like tough problems. They welcome highly-demanding tests of Vulcan tool steel superiority. They enjoy tackling a variety of problems, because Vulcan's complete line of fine quality tool steels allows them to give right answers—not “almost as good” recommendations.

A representative is nearby to serve you. *Vulcan Crucible Steel Division, H. K. Porter Company, Inc., Aliquippa, Pa.*



VULCAN Special Vanadium used for cold heading dies that are tough enough to produce slotted Nickel terminal screws at H. M. Harper Company, Morton Grove, Illinois.

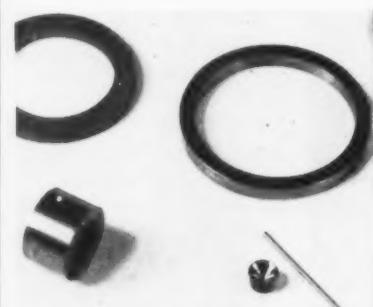


VULCAN CRUCIBLE STEEL DIVISION
H. K. PORTER COMPANY, INC.

Materials:

Platinum bonded tungsten carbide resists abrasion.

Platinum bonded tungsten carbide is reported to withstand a combination of extremely severe corrosive and abrasive service conditions. So states Kennametal, Inc., Latrobe, Pa., in introducing the material.



These parts have high resistance to corrosion and abrasion.

Typical applications now include: seal rings, which are applicable in handling fuming nitric acid; bushings; and a metering orifice. Other special parts made of this material have been utilized by the chemical industry. Corrosion resistance of this material is reported as very high.

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 81. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Diecasting:

“Crowning touch” emblems diecast of zinc.

Nameplates and emblems on a new product generally are considered a crowning touch. As such, they are engineered as carefully as the product itself. In addition

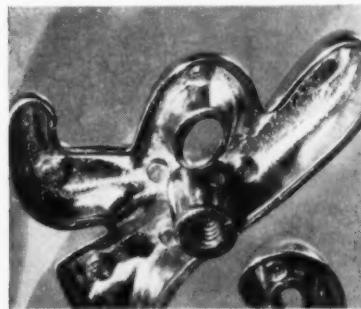
to unusual contours, clean-cut legibility and quality appearance, these insignia usually are designed for easy and permanent assembly.



These "crowning touches" are all certified zinc diecastings.

Many product nameplates and emblems are now produced by the diecasting process. Diecasting can be used on solid or cut-out lettering, individual letters, nameplates or odd-shaped emblematic designs.

Studs, shanks or bosses are formed of the diecasting metal itself or can be threaded inserts cast in place. By far the most widely used method of nameplate assembly is speed nuts or speed



Integrally cast projections aid assembly of the insignia.

clips, says the American Die Casting Institute. They can be applied very rapidly over cast projections to achieve permanent, non-rattling attachment to the product.

For those interested, ACDI members provide samples of actual insignia. These are finished in electroplated or painted coatings, or combinations of the two.



Keystone integrated aluminum conductor systems feature long life, minimum downtime, low installation costs, increased safety and high current capacity. Surrounding photo shows system being installed.

No winter downtime with Keystone Aluminum Conductor System

For two winters—and going into the third—Niagara Mohawk Power Company, Buffalo, has enjoyed trouble-free service with a Keystone integrated aluminum conductor system. The system replaced one of wire used with Niagara's traveling coal storage towers.

Service conditions are severe here. Ice is a big problem. Sulphuric acid fumes from coal piles cause corrosion. But with aluminum Inverted-V Keystone conductors and enclosures, these problems are solved.

Other advantages of Keystone integrated conductor systems improve operations indoors, too. Low voltage drop—rugged components—no wires to burn down. Steady operation is assured.

For further case history information and data on use of Keystone Aluminum Conductor Systems, call or write *Electric Service Works, Delta-Star Electric Division, H. K. Porter Company, Inc., Philadelphia 32, Penna.*

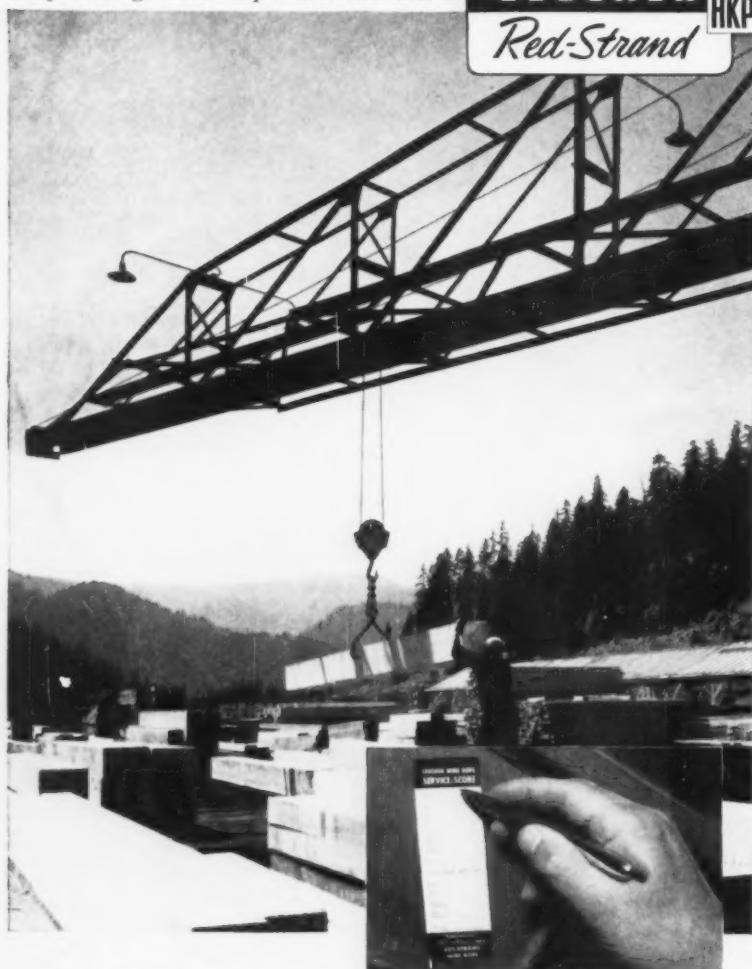
H.K.P.  ELECTRIC SERVICE WORKS
DELTA-STAR ELECTRIC DIVISION
H. K. PORTER COMPANY, INC.

Improving wire rope service with

LESCHEN

Red-Strand

HKP



TECHNICAL BRIEFS

Fastening:

Bonding film replaces rivets on plane.

The supersonic B58, newest Air Force super-bomber, uses a revolutionary bonding film, or cement instead of rivets in its fuselage, wings and tail assembly.

Employs Structural Bond

Designed and built by the Convair division of General Dynamics Corp., the four jet bomber employs a very high strength structural bonding adhesive. The joining material is a development of Convair and the B. F. Goodrich Industrial Products Co., Akron, Ohio.



Employee inspects a roll of the new strong bonding film.

How much can you save with Leschen wire rope service?

Wire rope costs can be reduced substantially—10%, 20% or more—by using the right rope type, construction and brand for every job.

How can you tell if you are using the right rope? How much can you save? There's a simple way to find out. You can obtain accurate, on-the-job performance data by using Leschen's Service-Score Sticker System. You'll prove to yourself which ropes work best. And when you see the score, you'll use more Red-Strand wire rope—because Leschen quality and Leschen engineering service can save you money.

Service-Score Stickers are available from any Leschen field man or distributor. Just ask, or write Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Mo.

HKP *LESCHEN WIRE ROPE DIVISION*
H. K. PORTER COMPANY, INC.

Finishing:

Chrome plating anodes have ripple-round design.

The never ending search for fast effective chrome plating methods has been evidenced by widespread acceptance of smooth round anodes in a few short years. However, not completely satisfied with even the high quality performance of the round anode, Alpha Metals, Inc., Jersey City, N. J., has perfected a "ripple round" lead alloy anode. It is designed to give platers maximum plating surface area.

Adds Deep Ripple

By adding a deep ripple to the conventional round anode, the makers increased surface area 6.8-pct without the slightest increase in anode size or weight. With this new round shape, the anodes present the highest active working surface believed possible.

The new anodes provide ample cross section to handle extremely



Anode's surface area increases; size, weight are unchanged.

high current densities without overheating. This increases anode life because the high densities permitted produce uniform lead peroxide coatings which protect against costly anode corrosion. Since they not only run cooler but are also more rigid, due to their construction, the warpage problem is eliminated.

Produces Standard Anodes

Alpha Metals, Inc., makers and developers of the ripple-round design, also produce and make available to electroplaters a line of smooth round and conventional type anodes.



LACLEDE-CHRISTY introduces new packaging for Refractory Specialties

For improved identification. Product and application data on Laclede-Christy's new castables, plastics, ramming mixes and bonding mortar, cartons and drums and bags are clearly visible and easy-to-read.

Improved product protection. Laclede-Christy cartons, drums and bags contain consistently high quality products securely protected during shipment and handling. Drums are sealed against weather and water.

New quality-first controls also are in effect at Laclede-Christy. They add to improved packaging as reasons why you profit by using Laclede-Christy refractory products. Your Laclede-Christy man will be glad to give you a complete report. See him soon. Laclede-Christy Division, H. K. Porter Company, Inc., St. Louis 10, Missouri.

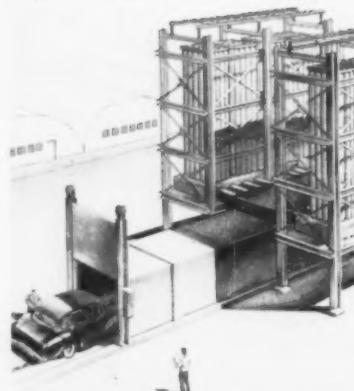
HKP **LACLEDE-CHRISTY DIVISION**
H. K. PORTER COMPANY, INC.

Scrap:

Air pollution nil; unit
burns 150 cars a day.

Burning anything in the open without running into trouble with local authorities has become a major headache for the salvage industry. To solve this, a manufacturer has introduced a new high production type auto burner.

Handling 80 to 150 car bodies a day, the equipment keeps air pollution low. The unit is so effective that its maker guarantees that it will comply with any existing air



This auto burner complies with local regulations.

pollution regulations in the user's area.

One piece of equipment has been operating in a semi-residential neighborhood for 14 months, and so far, reports the maker, no complaints have ever been received.

Originally developed to burn insulation from copper wire and other industrial wastes, the electronic smoke breaker eliminates the dense smoke and odors normally arising from such operations. The unit combines a simple scrubber with electrostatic precipitation.

The setup is manufactured by Smokatron Div. of Summer & Co., Columbus, Ohio.

GOSS and DE LEEUW

MULTIPLE SPINDLE

CHUCKING MACHINES

Four, Five, Six, Eight Spindles • Work and Tool Rotating Type
GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

FORGINGS

ALL SIZES, pressed . . . rolled . . . extruded . . . forged to accurate specifications from carbon, alloy, stainless steels and special metals. Modern metallurgical, die, heat-treating and rough machining facilities.

Over 50 years of forging design and development
THE CANTON DROP FORGING & MFG. CO.
CANTON, OHIO



more and more manufacturers
are saying: "Let's use

GRIFFIN
COLD ROLLED STRIP STEEL"

made to your specifications in all thicknesses from .012 to .375 inches and widths from $\frac{1}{2}$ " to 19" depending upon gauge.

**NARROW ROLLED ROUND
EDGE STRIP STEEL** In stock at

CENTRAL STEEL & WIRE CO.,
Detroit, Chicago, Cincinnati
Wm. H. LEONORI & CO., Inc.
New York City

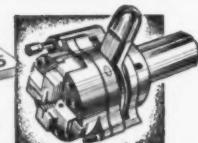
**GRiffin**

"since 1899"

MANUFACTURING CO. ERIE, PA.

STEEL TUBING**SERVICE STEEL**

DETROIT • BUFFALO • CHICAGO • CINCINNATI • LOS ANGELES



famous for accuracy and
straightness of threads, low chaser costs,
less downtime, more pieces per day.

THE EASTERN MACHINE SCREW CORP., 21-41 Barclay Street, New Haven, Conn.
Pacific Coast Representative: A. C. Behringer, Inc., 334 N. San Pedro St., Los Angeles, California.

Canada: F. F. Barber Machinery Co., Toronto, Canada

New

Make rigid set-ups in minutes on planers, drill presses, milling machines or other T-slotted beds or platens. Clamp slides or rotates to position on anchoring T-slot bolt. Drop forged, heat-treated body. Heat-treated screw has V-slotted swivel cap.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
Write for
Bulletin SUT 5209 Armstrong Ave., Chicago 30, U.S.A.

**FOR THE UNUSUAL IN**

*Seamless Steel
Tubing...*

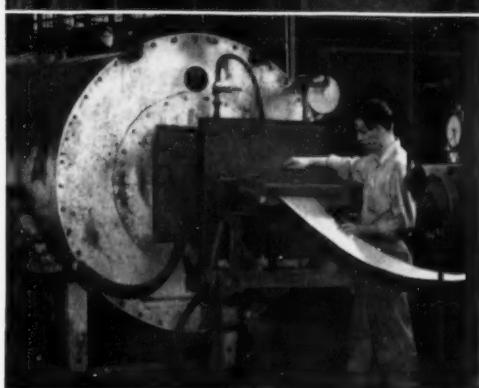
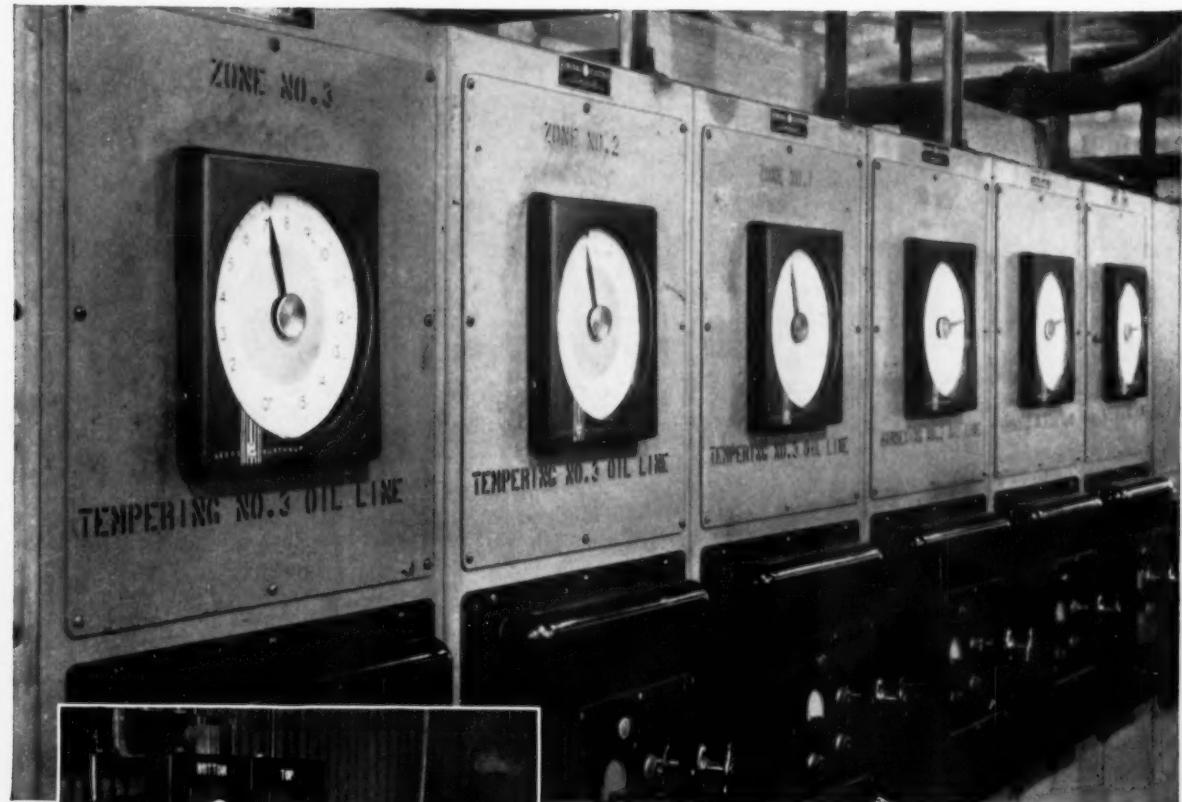
1 1/2" OD and smaller!

ELLWOOD IVINS STEEL TUBE WORKS INC.
700 VALLEY ROAD, PHILA. 26, PA.**ELLWOOD IVINS**

WRITE . . . PHONE . . . WIRE!

Zinc

STRIP, COILED
WIRE, COILED
ACCURATELY ROLLED FOR
ELECTRIC FUSE ELEMENTS
EYELETS—BRASS, STEEL AND ZINC.
THE PLATT BROS. & CO., WATERBURY, CONN.



"On Temperature" WITH SPEEDOMAX® H

Once operators at The Cold Metal Products Co. set their Speedomax H indicating and recording controllers, they can forget about temperature and attend to other production matters. In the Company's Youngstown, Indianapolis and Los Angeles plants, these men *know* their processes are on temperature and a glance at their Speedomax H instruments confirms it: black indicating pointers line up with red control point indexes.

Longtime users of L&N equipment, Cold Metal Products takes such control for granted. To meet customer specs for flat rolled spring steel, close temperature control is a "must." And Speedomax H helps by holding temperature "on the nose" on their continuous hardening, tempering and annealing lines, and on their bell-type annealing furnaces. Such close temperature control helps produce the same results again and again, assuring high product quality.

To find out more about Speedomax H temperature control for your process, contact your nearest L&N office or write 4956 Stenton Ave., Philadelphia 44, Pa.

LEEDS
Instruments



NORTHRUP
Automatic Controls • Furnaces



REDESIGNED HEADSTOCK is massive, rigid casting, eliminating vibration and assuring maximum accuracy. Electric combination clutch and brake permits fast, smooth starts and stops without overheating. The Gisholt main control (manually or hydraulically operated) and the simple push buttons and feed-stop valves speed changeovers. A wide range of spindle speeds permits peak machining efficiency on all materials.

GISHOLT JETRACER (mounted in place of standard front carriage) for either single or multiple pass work. For latter, JETRACER will make up to four consecutive, automatic passes from four templates of different lengths and patterns. **Standard rear independent slide** can operate any time within the general machine cycle to complete the part. **Air- or hydraulically-operated tailstock** can be easily mounted, positioned or removed.

High capacity + flexibility = economy ISN'T THIS WHAT YOU WANT

CONSIDER WHAT YOU CAN DO with this new Gisholt MASTERLINE No. 12 Automatic Production Lathe:

Here is an automatic lathe designed specifically for high production operations—yet this machine is flexible enough to handle a variety of similar parts in small repeat lots.

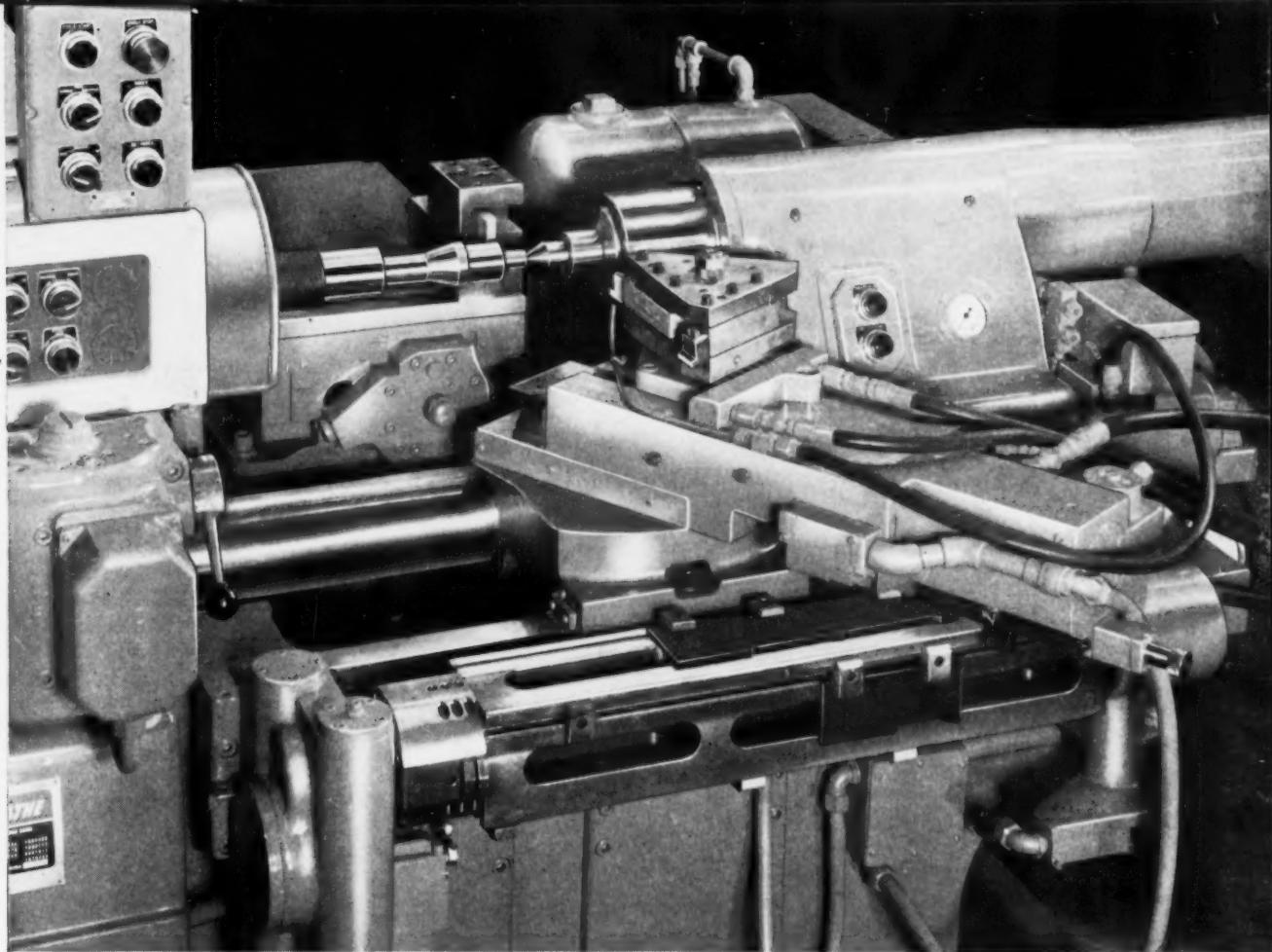
You can hold work in a chuck or fixture—with a work driver and tailstock—on an arbor or between centers. To start the automatic cycle, your operator simply loads the part, chucks it and raises the Main Control Lever. He is then free to handle additional

machines—or to perform other work—until the part is completed.

On the Gisholt No. 12 Automatic, all carriage and slide movements are hydraulically actuated. The front carriage has both longitudinal and transverse motion—or a combination of the two—with quick approach, automatic tool relief and rapid return. You can mount the rear independent slide at any angle to machine bevel gears, drill cones, or handle other parts with angular surfaces.

For special jobs—like machining both ends simultaneously on small motor frames, cylinder sleeves,



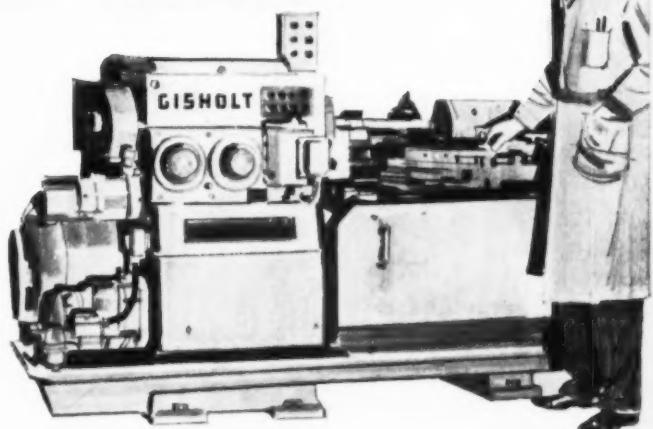


IN AN AUTOMATIC LATHE?

or similar parts—you get even greater flexibility from the No. 12 through auxiliary slides, operated by movement of the standard slides. Or you can mount a back facing attachment within the spindle—for still another way to machine a maximum number of surfaces in one chucking. And for outstanding versatility with great savings in tool and setup costs, the front carriage on the No. 12 may be replaced by a single- or four-pass JETracer slide.

For complete details of the new features on the Gisholt MASTERLINE No. 12 Automatic Production Lathe, call your Gisholt Representative.

WRITE GISHOLT TODAY for advance data on the new Gisholt MASTERLINE No. 12 Automatic Production Lathe. Ask for Form 1178.



GISHOLT
MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

To improve your product

NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies...for more data use the free postcard on page 81 or 82.

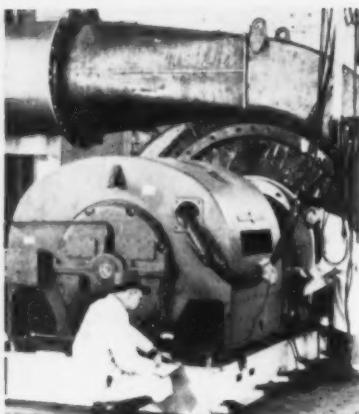


Laboratory vacuum system coats and degasses

Packaged as a unit, a new vacuum system is designed primarily for laboratory coating various materials with vaporized metals. The unit is also useful for other purposes, such as degassing liquids, crystal pulling and growing, melting small metal samples and degassing vacuum-tube electrodes. It can serve pilot plant or limited production use. The unit features a high-capacity pumping system which reduces pumping time. The standard pumping system consists of a 4-in. fractionating diffusion pump and a

5-cfm combination roughing and backing mechanical pump with vented exhaust. The pumps are operated by circuit breakers and are interlocked to prevent improper sequencing. Pump-down time with a clean, dry system is six minutes to 0.5-micron Hg, with an ultimate pressure of 2×10^{-5} mm Hg. A liquid-nitrogen trap will reduce this still further by a factor of 10 (2×10^{-6}). It is 88-in. high, 39-in. wide and 30-in. deep. *Consolidated Electrodynamics Corp.*

For more data circle No. 29 on postcard, p. 81



Compressor quartet delivers 1,300,000-lb of air per hour

This compressor is the third of a four-unit group to be used in furnishing air for a cyclone fired boiler in a new power station. They incorporate 48-in. intake and discharge connectors designed with unobstructed diffuser passages for high efficiency operation. They are of welded heavy-gage steel construction. Each is driven by a weather protected 1000-hp, 1800-rpm squirrel cage induction motor. The 48-in. unit is rated for delivery of 325,000-lb of air per hour

(78,200-cfm) at 65.5-in. w. g. static pressure. Total capacity of the group of four compressors is 1,300,000-lb of air per hour. Each compressor in the group is individually tested to insure conformance to the ASME power test code for centrifugal compressors. This provides rigid standards for: (1) capacity, (2) discharge pressure and, (3) brake horsepower over the entire operating range. *American Blower Corp.*

For more data circle No. 30 on postcard, p. 81



Materials handler uses a hydraulic torque converter

Incorporating a hydraulic torque converter, a new 1½-ton capacity industrial materials handling truck has a top speed of 12-mph. Higher speeds are available with special gear ratios. It is powered by a Wisconsin 15-hp air cooled engine directly coupled to a transmission consisting of a three element hydraulic torque converter and directional change clutches. Engine and transmission are coupled to the differential with an automotive

type drive shaft. No belts or chains are used. Operation of the truck is said to be safe, simple and smooth. The operator sets the directional change lever in either forward or reverse, presses the accelerator to move, and presses the brake pedal to stop. Wear and tear on all mechanical parts are cushioned by the hydraulic torque converter. Most parts are immersed in oil. *The Prime-Mover Co.*

For more data circle No. 31 on postcard, p. 81

To improve your product



BUY PROFIT IN ALCO CIRCULAR FORGINGS

Hi-Qua-Led* Steel forgings, available in any AISI Open Hearth Grade, can reduce machining time more than half, or increase tool life up to 1600 per cent. ALCO's experience and equipment build cost-reducing uniformity into standard circular forgings from 18- to 145-in. OD.

The big news is Hi-Qua-Led Steel. It was developed by ALCO to lower your machining costs on circular forgings — particularly in applications where a lot of metal must be removed. So far, customers using Hi-Qua-Led Steel forgings have reported as high as 69 per cent improvement in turning time, 41.2 per cent in teeth-cutting time. Hobbing tool life has been increased up to 1600 per cent. Even surface finish has been improved markedly.

There is no change in steel properties in Hi-Qua-Led Steel. It can be expected to perform exactly like a regular steel in the same grade. Customers report same response to heat treatment as regular steels.

You can profitably use Hi-Qua-Led Steel forgings if you put four or more hours machining into a circular forged piece, or if you do hobbing or other tough machining jobs with expensive tools. If your machining is not extensive, ALCO's regular circular forgings can still save you money with their high uniformity and exact conformance to your specifications.

We'd like you to have full information. Your nearest ALCO sales office will be happy to provide it, or, if you wish, you can receive complete explanatory information in Bulletins SF-1 and SF-2 by writing Spring & Forge Division, Dept. OCF-1, P.O. Box 1065, Schenectady 1, New York.

*Trademark reg. applied for. Patent applied for on lead-addition method.



ALCO PRODUCTS, INC.

NEW YORK

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Locomotives · Diesel Engines · Nuclear Reactors · Heat Exchangers · Springs · Steel Pipe · Forgings · Weldments · Oil-Field Equipment

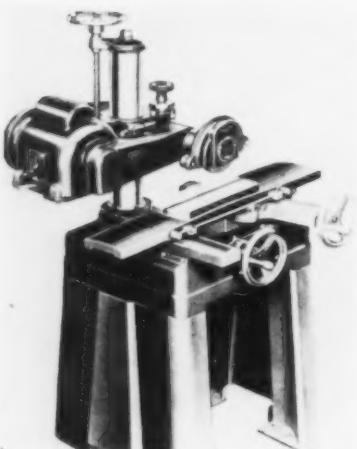


Automatic machine deburrs and chamfers hypoid pinions

A versatile single-station machine deburrs and chamfers medium to large hypoid pinions with short or long shafts. It handles pinions of eight to 15 teeth, with a range of $3\frac{1}{4}$ to 8-in. OD., and shaft lengths up to 15-in. Using a push-button controlled, automatic machining cycle, operation is so simplified that one unskilled operator can easily handle two machines. It comes to a full stop with the cutting tools retracted when the operation is completed. The unit performs the following: (1) deburrs and cham-

fers acute angle profile and part of root at toe end of each tooth, (2) does the same at the heel end of each tooth, and (3) when required, produces a peripheral chamfer on the large end, removing sharp edges. A light on the front of the machine stays lit while the machine goes through its cycle. Pressing a foot pedal ejects the part. A safety interlock prevents accidental ejection. *Modern Industrial Engineering Co.*

For more data circle No. 32 on postcard, p. 81



Surface grinder combines accuracy, simple setup

This surface grinder combines accuracy with simple setup. A big capacity grinder, it offers an extra ability to do chip-breaker and tool and cutter grinding. It is capable of doing more than 90-per cent of the precision grinding operations encountered in most shops, its maker says. Its key features include: (1) a bronze ring-oiling spindle bearing, "run-in" four hours and tested at the factory, (2) a column with a 360° swivel, $\frac{1}{2} \times \frac{1}{2}$ -in. key and adjustable gib, (3) a vertical feed screw with no backlash, and spindle adjustment in a vertical plane, (4)

a cross slide which can be locked to the base when transverse travel is not required; transverse screw is protected by canvas covers, (5) a longitudinal slide (table) with its surface guaranteed true because it is finish-ground by its own spindle as a final machine test, (6) motor and spindle pulleys fully machined for concentricity of pitch diameters with the bore, also dynamically balanced, and (7) a specially selected motor is balanced with a motor pulley. *Walker-Turner Div., Rockwell Mfg. Co.*

For more data circle No. 33 on postcard, p. 81



Electronic indicator measures to millionths of an inch

Small shops can now accurately measure to millionths of an inch with a portable dimensional gage and comparator. The amplifier and stand design combines accuracy of laboratory type instruments with versatility required for shop inspection and gage room use. It features three coded meter scales; this makes it easy to measure dimensional variations of 10-millionths to 10-thousandths of an inch. The change from coarse to fine mea-

surements is accomplished merely by turning the range switch. Zero points and readings coincide on all scales without separate adjusting for each scale. A wide range centering control permits shifting of the zero electrically to facilitate easy setup. The three pad base of the rack and pinion general purpose stand reduces the skill required for precise measurement. *Cleveland Instrument Co.*

For more data circle No. 34 on postcard, p. 81

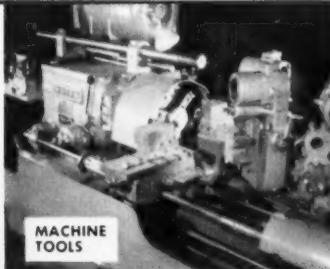
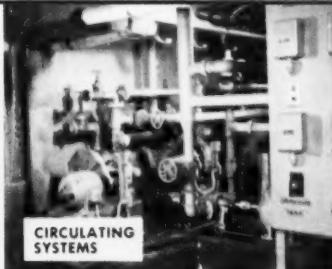
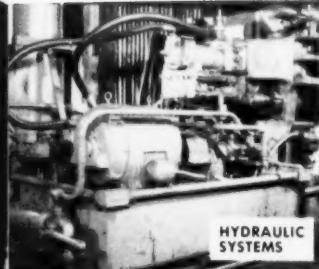


Flush raceway system modernizes existing buildings

Used primarily for modernizing existing buildings, this underfloor wiring duct is installed by trenching the floor so that the duct will be flush with the floor's surface. Linoleum or other top surface materials are then laid directly over the duct system. They are furnished in 10-ft lengths, with outlets spaced

every 24-in. along the duct. Each outlet is closed with a brass cover plate. It comes in single duct, two duct and three duct systems. The two and three duct systems are welded together. Flush junction boxes are similar to standard ones. *National Electric Products Corp.*

For more data circle No. 35 on postcard, p. 81



GENERAL LUBRICATION



SUN SOLNUS OILS IDEAL LUBRICANTS FOR 80% OF ALL APPLICATIONS

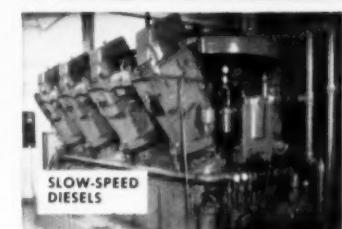
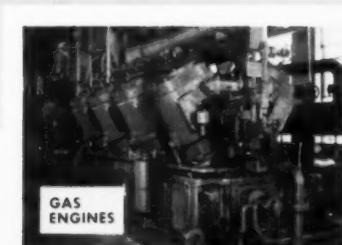
Moderately priced...low in carbon-forming tendencies, Sun Solnus® oils simplify your storage problems by doing with *one oil* many jobs that would otherwise require *several*. Their ability to protect metal parts against corrosion, their resistance to oxidation, and their moderate price all add up to "more lubrication per dollar."

For technical information, see your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-51.



INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY
PHILADELPHIA 3, PA. © SUN OIL CO.

In Canada: SUN OIL COMPANY LIMITED, Toronto and Montreal





Valve on left is from compressor run for 3,000 hours with well-known, high-grade oil. At right is same valve after a 3,000-hour run with Sun Solnus oil. Note difference in carbon deposits.

3000-HOUR TEST PROVES SUN SOLNUS OILS REDUCE CARBON BUILD-UP IN COMPRESSORS

Equipment: A three-stage Norwalk horizontal-type compressor. Operating pressure: from 1,000 to 1,500 psi.

Test: The compressor was cleaned thoroughly and filled with a well-known, high-grade oil. The equipment was run for 3,000 hours, then torn down for inspection and cleaning. Then Solnus® 300 was tested in the same way.

Results: Look at the two pictures. You can see for yourself how Solnus oil reduced dangerous carbon build-up.

All types of reciprocating air compressors that have been changed over to a Sun Solnus oil show similar results. A test in your compressor will show the same remarkable reduction of carbon deposits.

You can get a technical bulletin about Sun Solnus oils by asking your Sun representative, or write to **SUN OIL COMPANY**, Philadelphia 3, Pa., Dept. I-52.

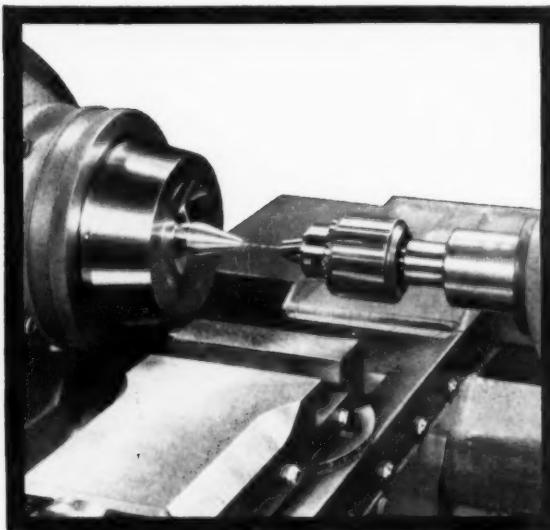


INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY **PHILADELPHIA 3, PA.**

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

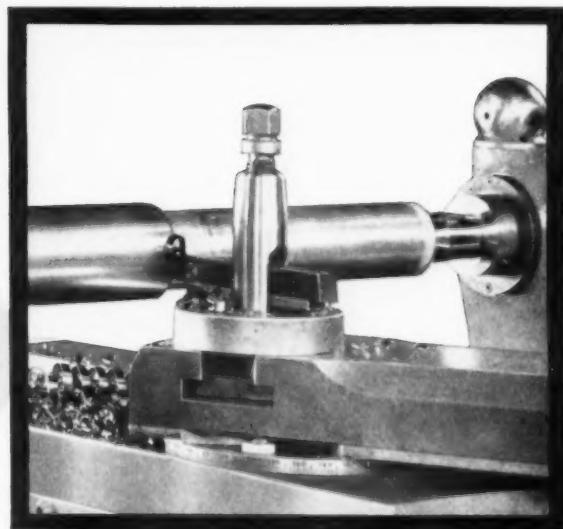
© SUN OIL CO.

Rivett's 2 for 1 Lathe!



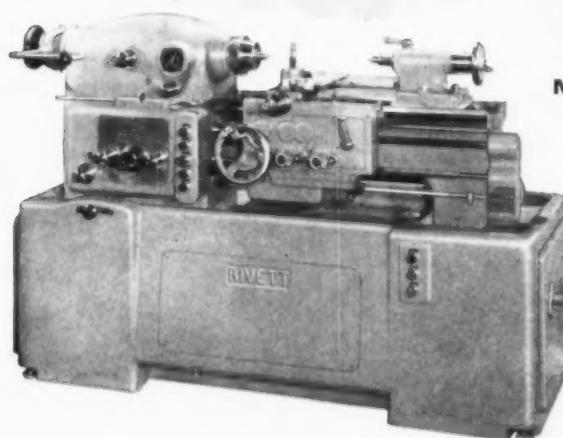
Sensitive...
As An Instrument Lathe

Responds to the lightest touch
of the operator. Turns within
.0004" in 12" length!



POWERFUL...
As An Engine Lathe

Full horsepower transmitted to
spindle. Takes $\frac{1}{4}$ " chip with
.020" feed on cold rolled steel.



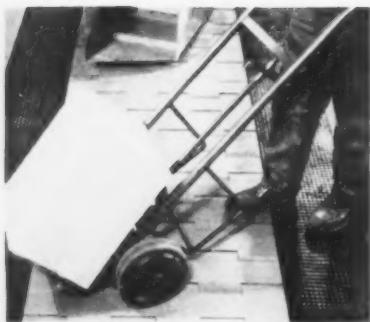
Go to Rivett now for information
about this big, beautiful machine.
Send for bulletin 1020B.

Model 1020S "Steelway" PRECISION TOOLROOM LATHE

This lathe has the industry talking! Because of extreme precision, it has long been recognized as the top tool by master mechanics. Now, its adaptability and broad usefulness have highlighted its productivity. As one satisfied user states, "Our toolmakers go to a Rivett first in preference to our other lathes!"

RIVETT LATHE & GRINDER, INC.
Dept. 1A-1, Brighton 35, Boston, Mass.



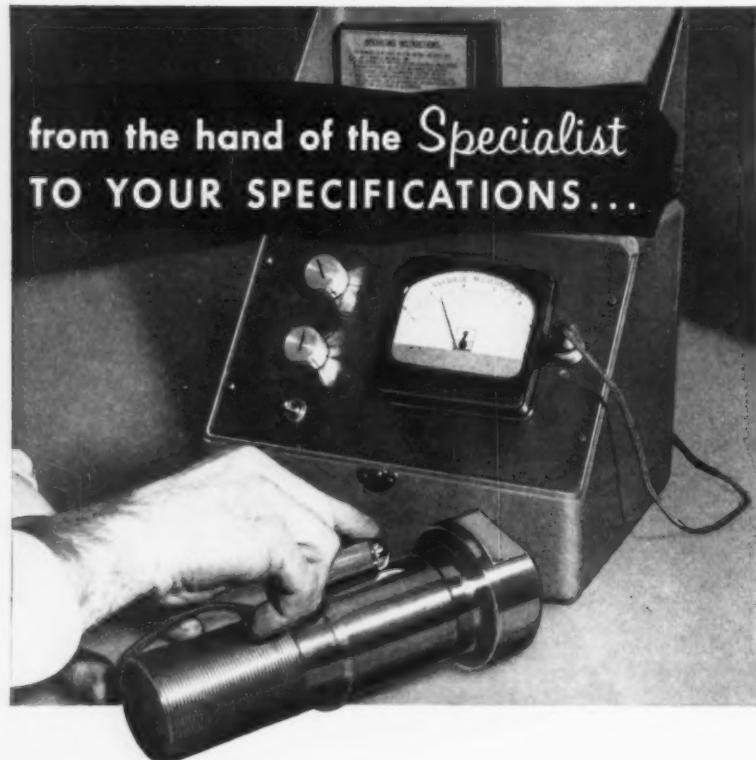


Flat-top steel conveyor belting handles wide stock

Flat-top steel conveyor belting can be installed flush with the floor or can handle parts or stock wider than the belt itself. In addition to conventional features, the conveyor eliminates hazards resulting from opening and closing of slats as they negotiate convex and concave turns. It can be used as a moving sidewalk flush with the floor for heavy-duty assembly work. Belt clearances are

such that ordinary nuts, bolts, and normally small tools will not fall through the belt. Belt length, width, speed and carrying capacity can be varied to meet individual needs. The conveyor can also be used in ordinary floor-mounted conveyors for handling many products. There are no stationary or moving parts that extend above the belt, allowing handling of stock wider than the conveyor itself. *May-Fran Engineering, Inc.*

For more data circle No. 36 on postcard, p. 81



ERIE Bolts • Studs • Cap Screws • Nuts In Alloys • Stainless • Carbon • Bronze

The reading on this Surfindicator measures more than just the fine finish on this special bolt. It measures the result of the precision craftsmanship your own specifications receive at Erie Bolt & Nut Company. Producing a wide variety of special fasteners to resist corrosion, extremes in temperature and tensile stresses as specified is our exclusive job . . . has been for almost half a century. Send us your specifications for prompt estimate.



ERIE BOLT & NUT CO.
Erie, Pennsylvania
Representatives In Principal Cities

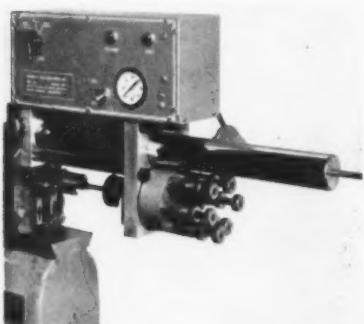
Screwdriver switch

Installed in limited-access areas, a new switch is actuated by a screwdriver. The compact switch is especially handy for installation in out-of-the-way places, or where a switch needs to be operated only occasionally. *Micro Switch Div., Minneapolis - Honeywell Regulator Co.*

For more data circle No. 37 on postcard, p. 81

Power feeds

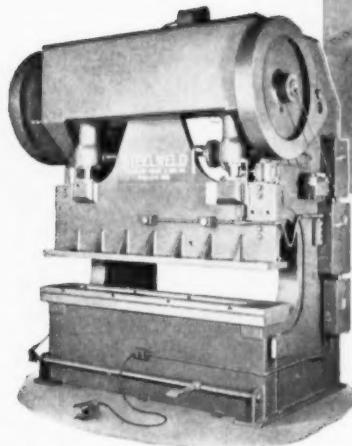
Turret lathe converters feature a separate feed for each turret position with infinitely variable feed adjustments. They operate on 50 to 100-psi air pressure. The automatic power feeds incorporate a hydraulic cylinder. The converters are compact packaged units, measuring



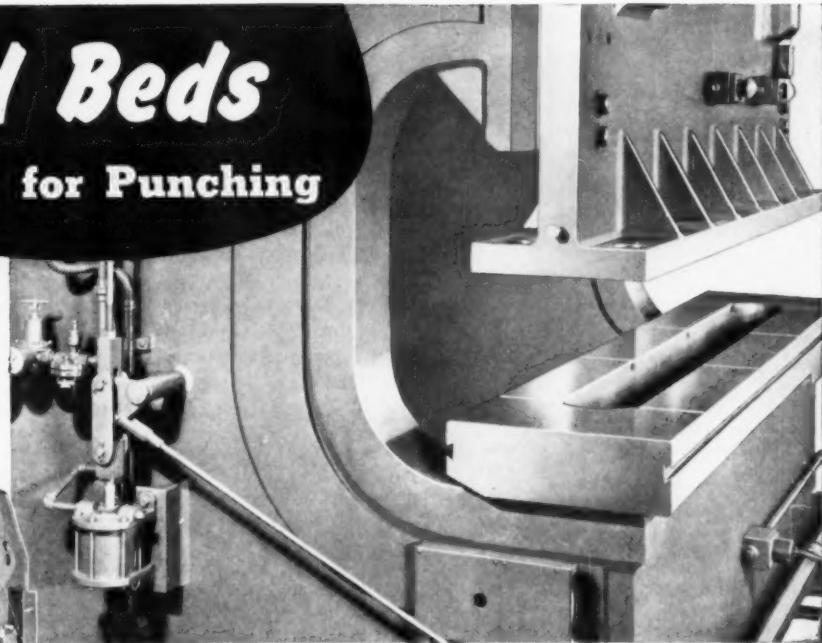
16 $\frac{3}{4}$ x 10 x 3 $\frac{1}{2}$ -in. overall. They have a 4-5-in. stroke, and are easily attached. They connect to the turret with a single removable pin so that the screw machine is not basically changed and the method of setting up remains the same with no additional time required. *Sandex Automation, Inc.*

For more data circle No. 38 on postcard, p. 81

Slotted Beds for Punching



Model H4-6 Press
with slotted bed. Handles plate to 6' 0" long between end housings. Operated by foot treadle or air-electric control.

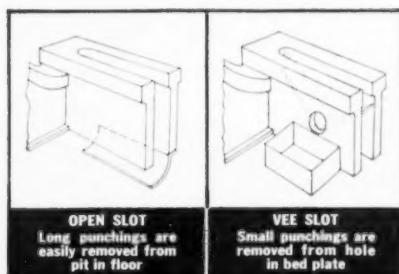


Converts Bending Press to Punch Press... and Cuts Costs as Much as 1/2

Because Steelweld Presses adapted for punching often cost as little as one-half that of ordinary punch presses a number of companies have purchased them and effected real savings.

Double-plate beds are usually employed with extra wide bed and ram to support the dies. In other respects the presses are standard. Machines have been built with beds as wide as 36", with slots in bed varying from 3" to 6 $\frac{1}{4}$ " wide. The punchings drop between the bed plates (See sketches) and are easily removed from behind the machine.

The same presses used for punching can be used for bending and other forming operations. Steelweld Presses are standardized in all lengths to 20'-0" and in various capacities to 750 tons. Larger sizes and capacities on request.



GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

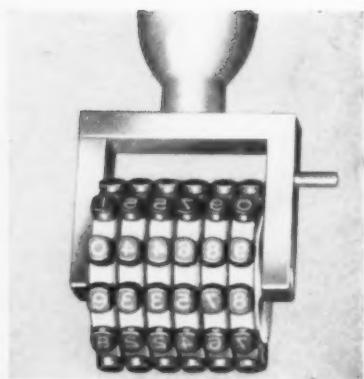


THE CLEVELAND CRANE & ENGINEERING CO.

4812 EAST 281ST STREET • WICKLIFFE, OHIO

STEELWELD BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING



Adjustable numbering device marks on all metals

Using an electro-chemical etching process, a lightweight numbering device permanently marks serial numbers on all metals. The adjustable unit is hand operated. It uses a standard power source, and has four or more plastic numbering wheels set in its stainless steel frame. Numerals, letters, or any other desired characters may be $\frac{1}{4}$ -in. square or smaller. The device provides quick, permanent marking and is as easy to use as a common

rubber stamp. It is the answer wherever consecutive or variable marking on metals is desired, the manufacturer says. Requiring little pressure for application, the electro-chemical process assures permanent markings without distortion or displacement of the metal. It cannot deform the piece, leave burrs, or cause stress or strain. *Electromark Corp.*

For more data circle No. 39 on postcard, p. 81

SEE FOR YOURSELF

why you can be sure of...

- LOW MICROINCH SURFACE FINISHES
- TOLERANCES DOWN IN THE MILLIONTHS
- INCREASED PRODUCTION
- LOWER COSTS

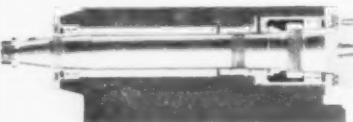
when you specify...

POPE PRECISION SPINDLES



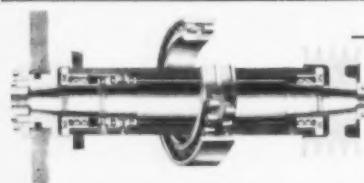
FOR SURFACE GRINDERS—

POPE 1, 2 and 3 HP, Totally Enclosed 1800 and 3600 RPM Motorized, Cartridge Type Spindles with massive shafts and big, double row cylindrical roller bearings having enormous capacity, superior performance and long life.



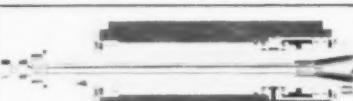
FOR BORING ROUND HOLES WITHIN MILLIONTHS OF AN INCH

POPE Heavy Duty Boring Spindles for smooth, chatter free, continuous high production of accurate parts. Again, look at the big cylindrical roller bearings and thrust bearings.



FOR CYLINDRICAL GRINDING—

POPE Cartridge Type and Wheel Head Belt Driven Spindles with the capacity to produce more work whether you plunge grind with a crush dressed wheel, remove surplus metal, or produce low microinch surface finishes. Note the super-precision radial bearings and ball thrust bearings.



FOR HEAVY DUTY MILLING—

POPE Spindles have the double row cylindrical roller bearings for the extra rigidity to support the cutting tool, and the double direction thrust bearings with the excess capacity to stabilize the shaft against endwise movement in either direction. This adds up to longer cutting tool life, more production, lower cost per piece.

POPE engineers and builds standard and special, precision anti-friction bearing Spindles for every purpose. Send us your specifications for prompt quotations.

No. 115

Specify
POPE
PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS

Lift truck

Fast, easy operation is the key feature of a new 2000-lb capacity, pneumatic tired lift truck. High torque characteristics and increased horsepower are provided by a four cylinder air-cooled engine. Operating ease and speed result from a repositioned instrument panel, upright design and constant mesh



transmission. With dental clutches, instead of sliding gears, the transmission gives long life and smooth shifting. UL approved LP-gas equipment is optional. LP-gas operation increases engine, oil and oil filter life, and offers low fuel costs, low maintenance costs and reduction of exhaust fumes. *Hyster Co.*

For more data circle No. 40 on postcard, p. 81

"Hammered" finish

Fast-drying, a one-coat hammered-effect lacquer is said to have excellent adhesion to most metals. The finish is easily applied with a standard spray gun. It comes in a wide range of metallic colors. *Maas & Waldstein Co.*

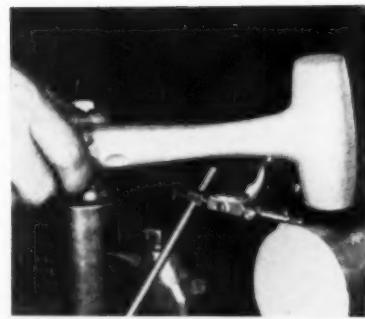
For more data circle No. 41 on postcard, p. 81

Soft-faced aluminum hammer won't chip or shear

Made of aluminum alloy, a soft-faced machinists' hammer is a non-marking tool with a 13-pct elasticity factor. The aluminum will not chip, mushroom, harden or shear. The hammer can be dressed over and over again. Its handle has dimpled finger grips as a safety feature; it can be bent double without breaking. Correct positioning of the hammer's center of gravity

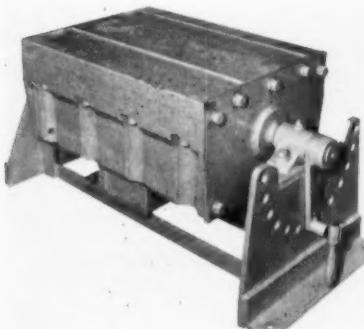
gives it a good "feel"; this makes it easy to use for long periods of time. The tool is recommended for use in automotive and aeronautical production, for positioning heavy dies, driving gear arbors or opening and closing jigs. It is available in two aluminum softnesses and eight sizes: $\frac{1}{2}$ to 5-lb. *Eclipse Pattern Works.*

For more data circle No. 42 on postcard, p. 81



Magnets

Savings on grinding costs are reported by foundries using this grinder holding magnet. Even odd-shaped castings are held securely in any position for grinding operations with it. Tilting models permit locking the working surface at any angle up to 30° in either direc-



tion. A powerful magnetic force grips the work firmly, requiring no special blocks, clamps or dangerous makeshift holders. Three sizes are available: 16 x 14-in., 16 x 24-in., 16 x 40-in., wound for 115 or 230-v dc with hand or foot switch. *Stearns Magnetic Products Div., Indiana Steel Products Co.*

For more data circle No. 43 on postcard, p. 81

Tooth slot cutter

Standard flat-faced-blade staggered tooth slotting cutters work aluminum, its alloys and other light metals. Standard in 102 sizes, the new series provides cutters ranging from $\frac{3}{8}$ to 2-in. wide and diameter from 4 to 16 in. Two keyways are provided on all cutter bodies. *Goddard & Goddard Co.*

For more data circle No. 44 on postcard, p. 81

new McCaffrey **MACGRAB** combination magnet-grapple

TRADE MARK



PATENT APPLIED FOR

handles more materials **FASTER, CHEAPER, EASIER!**

With MacGrab's GIANT BITE your scrap-handling costs go *down*... speed and efficiency go *up*. Baled materials, small loose or prepared scrap, springy stuff, scrap metals of any kind, clean-up jobs...they're all the same to MacGrab's powerful magnet and keenly pointed tines. Positive closing power is applied to all four tines. MacGrab's simple construction means fewer moving parts to wear out, yet less weight than any unit of similar capacity. Your operator can use either the grapple or the magnet, or both at once... depending on the job. MacGrab is built for $\frac{3}{4}$ -yard or larger cranes, works easily in a standard 8-foot truck body.

MacGrab's savings add profits for you if working scrap is your business. Mail the coupon today for complete information.



M. P. McCAFFREY, INC.
2131 East 25th Street
Los Angeles 58, California

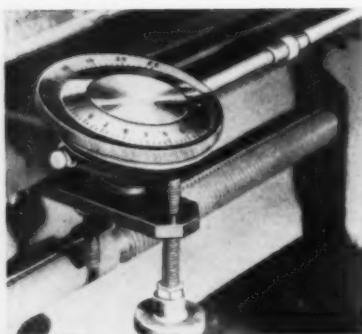
Please send without obligation,
complete information on the new
MacGrab magnet-grapple.

Name _____

Company _____

Street _____

City _____ State _____



Travel gage measures lathe carriage travel in one setup

Lathe carriage travel is measured in a single setup with a sturdy vernier travel gage. It is made to withstand rough and tough, and even careless use—though the latter is not recommended. The 4-in. gage measures 4-in. or more of carriage travel. By using 4-in. exten-
tions, measurements can be made at greater lengths. One, 2, 3, 4 or more 4-in. exten-
tions can be used. Each can be removed

as the carriage moves toward the work without resetting the 4-in. gage or disturbing the accuracy. Measurements are read similarly to those made with a conventional vernier gage. Graduations reading to thousandths of an inch and numbers stand out clearly against a satin-chrome finish. It is rust-proofed throughout. *Lloyd Tool Corp.*

For more data circle No. 45 on postcard, p. 81



Install Thomas Flexible Couplings

First cost is only cost when you buy Thomas Flexible Couplings . . . because Thomas Flexible Couplings are correctly engineered, have no wearing parts . . . need no lubrication . . . eliminate future maintenance costs. Even more, Thomas all-metal couplings can be inspected while running—ending inspection shut-downs!

For all practical purposes, properly installed and operated within rated conditions, Thomas Flexible Couplings will last forever.

NO LUBRICATION . . .

NO MAINTENANCE . . .

There Are No Wearing Parts

Under load and misalignment, only Thomas Flexible Couplings offer all these advantages:

1. Freedom from backlash—torsional rigidity
2. Free end float
3. Smooth, continuous drive with constant rotational velocity
4. Visual inspection while operating
5. Original balance for life

Write for Engineering Catalog 51A

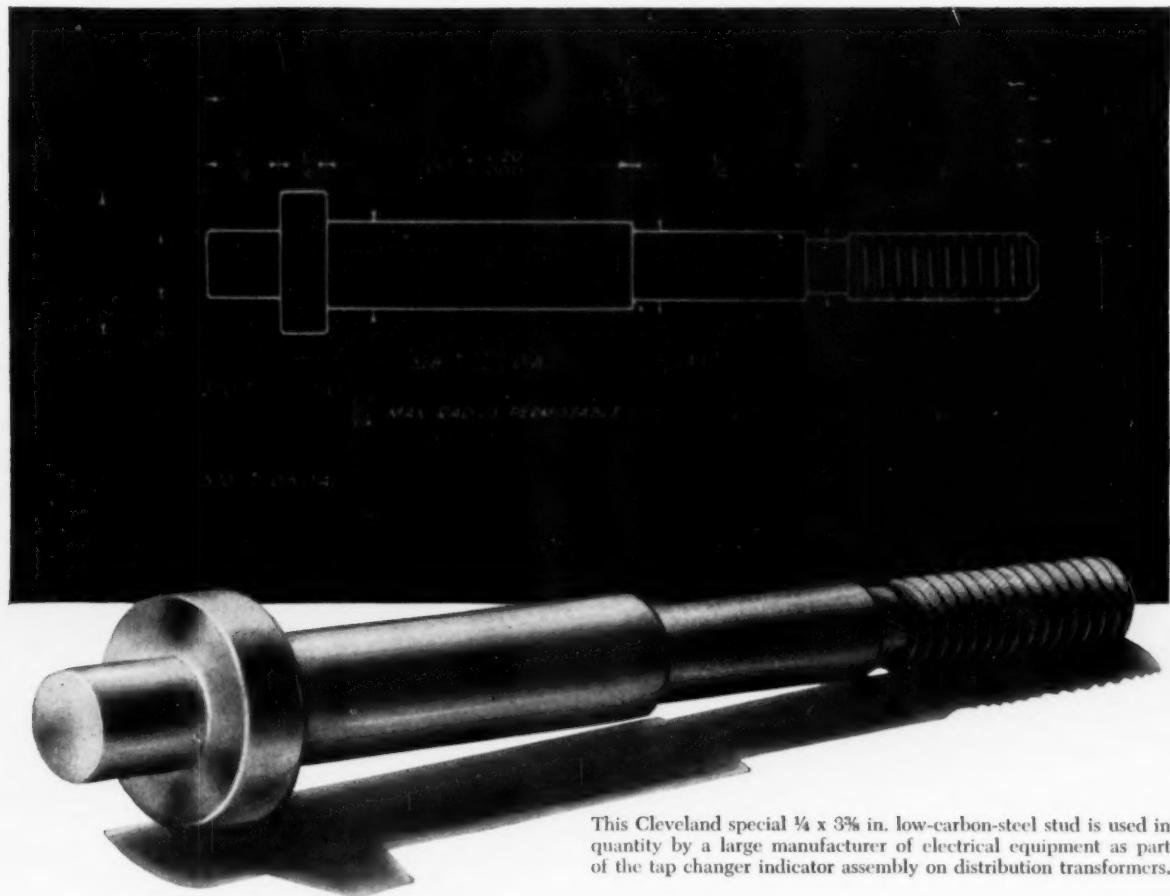


WARREN, PA.

combination air friction clutch and brake unit is mounted on the crank-shaft within the main drive gear. The drive gear itself turns on anti-friction bearings and is totally enclosed running in oil. This arrangement makes it possible to offer variable speed operation, such as 37 to 74 spm with standard 5-in. stroke. This increases adaptability through suitable speed selection. *The Minster Machine Co.*

For more data circle No. 46 on postcard, p. 81

CLEVELAND SPECIAL HEADED AND THREADED PRODUCTS



This Cleveland special $\frac{1}{4} \times 3\frac{3}{8}$ in. low-carbon-steel stud is used in quantity by a large manufacturer of electrical equipment as part of the tap changer indicator assembly on distribution transformers.

Cost of special collar stud is cut 20% by Cleveland's cold forming techniques

The famous Kaufman Double Extrusion Process which turns out millions of Cleveland precision cap screws yearly is highly adaptable to low-cost production of your fastener-type specials.

The tap changer stud pictured above is typical. Used by a well-known electrical equipment manufacturer, it was previously cut from

bar stock. The special head, double shoulders, and groove above the threads meant numerous machining operations and considerable scrap.

Cleveland now cold forms this special stud at 20% less cost to the customer, while holding the specified .005 in. tolerance. And the part is stronger. In the head, threads and fillets, grain flow is symmetrical and unbroken. In addition, the forging action of the Kaufman process toughens surface metal while

leaving the core ductile. Both fatigue resistance and tensile strength are thus increased.

We are regularly cold forming close-tolerance specials—many with unusual or extreme upsets—in large quantities. So whether your part is simple or complex, it will pay you to check with Cleveland, particularly at the design stage. There is an excellent chance that through cold forming we can cut the cost and improve the physical properties of the part you have in mind.



Black area represents metal that had to be cut away when stud was produced by machining. In the Cleveland cold forming process almost all the metal in the working slug is present in the finished part. The customer saves the difference.

Write for a copy of our folder "Specials by Specialists"



THE CLEVELAND CAP SCREW COMPANY
4444-1 Lee Road, Cleveland 28, Ohio

STEEL MEN!



WHY PAY MORE THAN \$12 PER TON FOR FLUX BLOCKS?

ORIGINALLY, glass tanks were built of small, fire-clay brick or sandstone blocks. No. 1 fire-brick of this type can be bought for \$12 per ton. Clay flux blocks of essentially the same materials cost \$60 per ton. Why pay a 500% premium simply to get bigger pieces of the same material?

Your reply, of course, is that the larger pieces improve furnace life by 40% to 50% — that you are willing to pay 500% more for your blocks, to get 50% greater life for your tanks. And that is true of every glass-tank owner in America today. Since you are already paying a 500% premium for a 50% return, why is it not logical for you to buy Corhart Electrocast, at a smaller price premium over clay, AND GET OVER 200% INCREASE IN FURNACE LIFE?

If you are looking for economy in the

purchase of your tank blocks, you need pay only \$12 per ton. On the other hand, if you want the lowest cost per day of tank life, or the lowest cost per ton of glass produced, you can not stop at the \$12 block or at the \$60 block.

Corhart Electrocast is the world's highest-priced refractory per ton of blocks, and the lowest-cost refractory per ton of glass produced . . . May we prove it to you? Write for definite facts. Address: Corhart Refractories Co., Incorporated, 16th and Lee Sts., Louisville, Ky.

CORHART ELECTROCAST REFRACTORIES

IN June, 1933, when this old ad appeared, Corhart Electrocast was still new in the glass industry. Only a few glass companies dared then to buy it, "one of the world's highest-priced refractories". But today its use is practically universal . . .

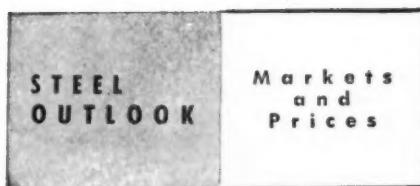
Now Corhart 104 is still new in the steel industry — but despite its high price, it offers steel furnace operators the same opportunities for greater production and lower costs that Corhart Electrocast brought to glass.

May we send you complete data? Address: Corhart Refractories Co., Incorporated, 1610 West Lee Street, Louisville, Kentucky, U.S.A., SPring 8-4471.



CORHART 104 ELECTROCAST REFRACTORY

The words "Corhart" and "Electrocast" are registered Trade Marks which indicate manufacture by Corhart Refractories Company, Incorporated, Corhart Refractories Co., Incorporated, 1600 West Lee Street, Louisville 10, Kentucky, U.S.A.—Telephone SPring 8-4471.



The Iron Age SUMMARY...

Steel orders are keeping pace with shipments . . . But mills are jittery over slow orders from Detroit . . . Steel prices continue to move up quietly . . . Scrap prices down

Business Good, But . . . Steel mills have all the business they can handle at the moment. Incoming orders are equaling or exceeding shipments. But Detroit's shaky '57 start has the mills worried. Some of the automakers are dragging their feet on steel orders.

The effect on steel depends on where you sit. Some mills say their auto business is holding up. Others say they are taking a beating. Overall, it's not as bad as some reports seem to indicate.

The sales picture in Detroit is blowing hot and cold, depending on the producer. Sales of low-priced models are gaining momentum. One manufacturer is working his plants overtime to meet demand. But dealers are running into price resistance on medium-priced cars. If this keeps up, there may be some pencil-sharpening on medium-priced autos.

Mills are booked solid on most products for the first quarter. This includes cold-rolled sheets, despite last-minute order deferments that call for some scrambling to dispose of the extra tonnage.

Prices Up . . . Steel prices are still moving up quietly. Increases of base prices have been scat-

tered and insignificant. But increases in steel price extras are cropping up almost daily. More such increases are likely to be in the works.

Another disappointment to steel mills—thus far—has been slow ordering from appliance makers. An expected rush from appliance companies has not materialized.

Other steel-consuming industries are more than taking up the slack. These industries include oil and gas, freight cars, construction, and shipbuilding. Some mills are operating at above capacity based on new capacity figures which are five million tons higher than in 1956.

Scrap Down . . . Plate users got a slight break this week when a major producer deferred shutdown of its sheared plate mill from Jan. 1 to Feb. 1. Construction delays were partly responsible. But when the shutdown does come, it will cut the company's sheared plate output by 40 pct for at least two months.

Steel scrap prices continue to move away from the record highs of the year-end. Prices in major consuming areas dropped as much as \$3 per ton. The near-term outlook is for continued weakness.

Steel Output, Operating Rates

Production (Net tons, 000 omitted)	This Week	Last Week	Month Ago	Year Ago
Ingot Index (1947-1949=100)				
157.0	154.6	156.3	147.7	
Operating Rates				
Chicago	97.0	102.0	101.0	97.5
Pittsburgh	101.0	100.0*	102.0	102.0
Philadelphia	104.0	102.0	103.5	104.0
Valley	99.5	99.5*	100.0	99.0
West	100.0	100.0	103.0	101.0
Detroit	105.0	99.0*	104.0	103.0
Buffalo	105.0	105.0	105.0	105.0
Cleveland	94.0	96.0*	104.0	100.0
Birmingham	95.0	90.0	94.0	95.0
S. Ohio River	95.0	90.0	96.0	89.0
Upper Ohio R.	101.0	99.5*	104.0	96.0
St. Louis	96.0	64.0	98.0	99.0
Northeast	100.0	100.0	100.0	80.0
Aggregate	98.5	97.0	102.0	98.5

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)				
	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.622	5.622	5.622	5.174
Pig Iron (Gross Ton)	\$62.90	\$62.90	\$63.04	\$59.09
Scrap, No. 1 hvy (gross ton)	\$60.83	\$63.50	\$64.33	\$53.67
Nonferrous				
Aluminum ingot	27.10	27.10	27.10	24.40
Copper, electrolytic	36.00	36.00	36.00	43.00
Lead, St. Louis	15.80	15.80	15.80	16.30
Magnesium ingot	36.00	36.00	36.00	33.25
Nickel, electrolytic	74.00	74.00	64.50	64.50
Tin, Straits, N. Y.	99.50	101.00	110.50	107.00
Zinc, E. St. Louis	13.50	13.50	13.50	13.00

*Revised

Plate Extras Join Parade

New extra charges on plate and structurals follow those made recently on sheet and strip . . . Two producers raise base prices . . . More firms hike stainless bases.

♦ FIRST IT WAS SHEETS. Then strip. And now plate and structural extras have been increased by many of the major steel producers.

These widening ripples on the price pool reflect more than the spreading interest in hiking extras to meet rising costs. They also indicate the deep-rooted cost versus price struggle going on in the minds of producers. And each change in prices makes others more likely.

While extras have accounted for the overwhelming number of recent changes there have been isolated instances where base prices have also been lifted. Besides an increase in the price of carbon plate at Claymont, Del., by Colorado Fuel & Iron Corp., Inland Steel Co. has announced a new base price on wide-flange shapes. Effective the first of the year, it's an increase in price of \$5.00 per ton.

Here's a rundown on the new extra charges announced by the mills, most of them on plate and structural shapes and all effective on or before Jan. 1.

Jones & Laughlin Steel Corp.: Size and section extras for structural shapes. Standard channels and junior channels up \$6 per ton, junior beams up \$4 per ton, and standard angles up from \$2 to \$8 per ton. The company has also changed quantity extras for cold finished carbon steel bars and shafting on all specifications less than 40,000 lb. New extras range from \$5.50 for less than 300 lb to 5¢ for 20,000-39,999 lb.

Inland Steel Co.: New extra charges on structural shapes and plates increasing prices on these items by about 5 pct.

Youngstown Sheet and Tube Co.: Increased extras on plates of

both carbon and Yoloy high strength steels. Adjustments range from \$1 to \$7 per ton for extra requirements in thickness, width, quality, specification and chemical content. Also upward revisions in extras for h-r strip in carbon and Yoloy steel products. Increases here are within a \$1 to \$4 per ton range.

Lukens Steel Co.: Five pct increase in h-r carbon plate extras.

Phoenix Iron & Steel Co.: An increase of about 5 pct in extras on plates and structural shapes.

Bethlehem Steel Co.: Extra increases on h-r carbon steel shapes, both wide flange and standard, and h-r carbon steel plates.

Other Price News: New prices for nickel-bearing stainless steels have been announced by Wallingford Steel Co., Jessop Steel Co., G. O. Carlson, Inc. and Eastern Stainless Steel Corp. Move follows similar increases announced earlier by other producers. (New stainless prices are in table on p. 109.)

Mystic Iron Works has raised the base price of pig iron at Everett, Mass. by \$1.25 per ton for the first three months of 1957. New prices are: foundry pig iron—\$65 per ton and malleable pig iron—\$66.50.

Purchasing Agent's Checklist

SPECIAL REPORT: You can do business with air freight . . . p. 19

MANAGEMENT: A supply forecast: What's ahead for steel users . . . p. 24

BUSINESS: When are machines obsolete? . . . p. 26

MACHINE TOOLS: Big orders are on the way for the machine builders . . . p. 45

Key to the supply situation for flat-rolled products, especially cold-rolled sheet, continues to be the buying of the auto firms.

At present, while the sheet market is relatively strong, automotive buyers are not making too many demands on producers. This could change as the carmakers stock up for their spring selling season.

Net result now is a variety of market conditions. Some midwest mills are telling warehouses they might be put on an allocation status if auto business holds up. On the other hand, there are reports from another market area that mills are offering sheet for February delivery. Probably the hazy market picture won't clarify until second quarter ordering begins.

BARS . . . Over-all picture shows hot-rolled carbon bar very tight, while cold finished is easier.

Carryovers in h-r at Chicago range from two to six weeks. At Pittsburgh one producer will go into February with carryovers in h-r and feels orders for that month will be increased over current levels. Shipments to cold finishers, while off, are still at high levels.

At Cleveland standard size cold finished bars are available for one week delivery if the hot-rolled can be obtained. If not they require 5-8 weeks delivery.

There's only limited acceptance of hot-rolled orders in Philadelphia area.

Detroit indicates while carbon bars are tight the situation may be easing somewhat.

SHEET AND STRIP . . . Expected push from auto and appliance makers for c-r sheet hasn't shown itself yet at Cleveland. An Ohio river plant has even told producers it will not order sheet during the first quarter until inventories are worked down.

At Detroit the cold-rolled market isn't really strong, although it's still good. Hot-rolled is in short supply with one mill reporting carryovers. There's an indication mills are rolling light plate rather than h-r sheet.

Mills at Chicago are sold out on sheet and strip through the first quarter. Carryovers in the district on h-r sheet range from 20 days to over four weeks.

In the Philadelphia market h-r products are fairly tight, while c-r products are a little easier.

Comparison of Prices

(Effective Jan. 8, 1957)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Jan. 8 1957	Jan. 1 1957	Dec. 11 1956	Jan. 10 1956
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.675¢	4.675¢	4.675¢	4.825¢
Cold-rolled sheets	5.75	5.75	5.75	5.825
Galvanized sheets (10 ga.)	6.30	6.30	6.30	5.85
Hot-rolled strip	4.675	4.675	4.675	4.325
Cold-rolled strip	6.870	6.870	6.870	6.29
Plate	4.87	4.87	4.87	4.52
Plates, wrought iron	10.40	10.40	10.40	10.40
Stain's C-R strip (No. 302)	50.00	50.00	47.50	44.50

Tin and Terneplate: (per base box)

Tinplate (1.60 lb.) cokes	\$9.95	\$9.95	\$9.95	\$9.05
Terneplate, electro. (0.50 lb.)	8.65	8.65	8.65	7.75
Special coated mfg. ternes	9.20	9.20	9.20	7.85

Bars and Shapes: (per pound)

Merchant bars	5.075¢	5.075¢	5.075¢	4.65¢
Cold finished bars	6.85	6.85	6.85	5.90
Alloy bars	6.125	6.125	6.125	5.65
Structural shapes	5.00	5.00	5.00	4.60
Stainless bars (No. 302)	43.25	43.25	40.75	38.25
Wrought iron bars	11.50	11.50	11.50	11.50

Wire: (per pound)

Bright wire	7.20¢	7.20¢	7.20¢	6.25¢
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Rails: (per 100 lb.)

Heavy rails	\$5.075	\$5.075	\$5.075	\$4.725
Light rails	6.00	6.00	6.00	5.65

Semi-finished Steel: (per net ton)

Rerolling billets	\$74.00	\$74.00	\$74.00	\$68.50
Slabs, rerolling	74.00	74.00	74.00	68.50
Forging billets	91.50	91.50	91.50	84.50
Alloy blooms, billets, slabs	107.00	107.00	107.00	96.00

Wire Rod and Skelp: (per pound)

Wire rods	5.80¢	5.80¢	5.80¢	5.025¢
Skelp	4.225	4.225	4.225	4.225

Finished Steel Composite: (per pound)

Base price	5.622¢	5.622¢	5.622¢	5.174¢
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Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

STAINLESS STEEL

← To identify producers, see Key on P. 120 →

Base price cents per lb f.o.b. mill

Producing Point	Basic	Fdry.	Mill.	Bess.	Lew. Phes.	Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Birdsboro, Pa. B6	64.50	65.00	65.50	66.00	.....	Ingots, reroll.	21.25	22.75	22.25	24.25	—	26.00	38.25	31.00	35.50	—	16.00	27.75	16.25
Birmingham R3	58.50	59.00*	.....	.....	.....	Slabs, billets	26.00	29.00	27.00	30.25	30.75	32.00	47.50	38.50	44.75	—	20.75	—	21.00
Birmingham W9	58.50	59.00*	63.00	.....	.....	Billets, forging	—	35.00	35.75	36.50	39.50	39.00	59.75	45.25	53.50	30.75	27.25	27.75	27.75
Birmingham U4	58.50	59.00*	63.00	.....	.....	Bars, struct.	—	41.25	42.50	43.25	46.25	46.00	70.25	53.25	62.25	36.25	32.50	33.00	33.60
Buffalo R3	62.50	63.00	63.50	64.00	.....	Plates	—	43.25	44.50	45.50	48.00	48.75	73.75	57.50	67.00	38.75	33.75	35.50	34.50
Buffalo H1	62.50	63.00	63.50	64.00	.....	Sheets	46.75	47.25	49.25	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Buffalo W6	62.50	63.00	63.50	64.00	.....	Strip, hot-rolled	34.50	37.50	35.75	39.00	—	42.50	66.50	51.50	61.00	—	29.75	—	30.75
Chester P2	64.50	65.00	65.50	66.00	.....	Strip, cold-rolled	43.25	47.25	45.75	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Chicago 14	62.50	63.00	63.00	63.50	.....	Wire CF; Rod HR	—	39.25	40.25	41.00	44.00	43.75	66.75	50.50	59.25	34.50	31.00	31.50	31.50
Cleveland A5	62.50	63.00	63.00	63.50	67.50†		40.50	41.25	—	—	—	47.00	51.00	59.50	—	—	—	—	—
Cleveland R3	62.50	63.00	63.00	63.50	67.50†														
Duluth 14	62.50	63.00	63.00	63.50	67.50†														
Erie 14	62.50	63.00	63.00	63.50	67.50†														
Everett M6	65.00	65.50	.....	.....	.....											
Fontana K1	70.00	70.50	.....	.....	.....											
Geneva, Utah C7	62.50	63.00	63.00	63.50	.....													
Granite City G2	64.40	64.90	65.40	.....	.....												
Hubbard Y1	62.50	63.00	63.00	63.50	.....													
Lone Star L3	58.50†	59.00†	.....	.....	.....											
Midland C11	62.50	63.00	63.00	63.50	.....													
Minnequa C6	64.50	65.00	65.50	.....	.....												
Moneaen P6	62.50	63.00	63.00	63.50	67.50†														
Neville Is. P4	62.50	63.00	63.00	63.50	67.50†														
N. Tonawanda T7	63.00	63.50	63.00	63.50	.....													
Pittsburgh U1	62.50	63.00	63.00	63.50	.....													
Sharpsburg S3	62.50	63.00	63.00	63.50	.....													
So. Chicago R3	62.50	63.00	63.00	63.00	.....													
Sweden A2	64.50	65.00	65.50	65.50	.....													
Toledo I4	62.50	63.00	63.00	63.50	.....													
Trey, N. Y. R3	64.50	65.00	65.50	66.00	70.50														
Youngstown Y1	62.50	63.00	63.50	63.50	.....													

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa. C11; Brackenridge, Pa. A3; Butler, Pa. A7; Vandergrift, Pa. U1; Washington, Pa. W2, J3; Baltimore, Md.; Middletown, O. A7; Massillon, O. R3; Gary, U1; Bridgeville, Pa. U2; New Castle, Ind. I2; Ft. Wayne, I4; Philadelphia, D5.

Structs: Midland, Pa. C11; Waukegan, Cleveland A5; Carnegie, Pa. S9; McKeesport, Pa. F1; Reading, Pa. C2; Washington, Pa. W2; Leechburg, Pa. A3; Sharon, Pa. U2; Detroit, M2; Canton-Massillon, O. R3; Harrison, N. J. D3; Youngstown, C5; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Waukegan, A5; Canton, O. T3; Ft. Wayne, I4; Philadelphia, D5; Detroit, R5; Gary, U1; C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; Syracuse, N. Y. U1; C11; Watervliet, N. Y. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O. R3; S. Chicago, U1; U2; Wallingford, Conn. U3 (plus further conversion extras); New Bedford, C11; Watervliet, N. Y. A3; Syracuse, C11; S. Chicago, U1; Reading, Pa. C2; Titusville, Pa. U2; Washington, Pa. W2; Leechburg, Pa. A3; Butler, Pa. U2; Dunkirk, N. Y. A3; Massillon, O

Price Break Gains Momentum

Decline in auto lists is followed in most market areas . . . Further declines may be ahead . . . Trade is in a selling mood . . . Prices off nearly \$5 in month.

◆ **BIDDING** on automotive scrap lists again proved to be a reliable barometer of the scrap market.

Following the refusal of mills and brokers to get excited over the record tonnage of choice automotive scrap, most major markets dropped from \$2 to \$3 on steelmaking grades; varying amounts on others.

In the space of about a month, markets have seen a decline of about \$5 for most grades. THE IRON AGE Composite has dropped from \$65.17 Dec. 11 to this week's figure of \$60.83.

The question now is whether recent drops represent a real break in the market. Or it could be merely a decline from inflated levels to a more realistic price structure.

Some markets that dropped before or with the closing of January auto lists dropped again, or appeared poised on the brink of another decline.

Most of the trade is in a selling mood. In Chicago, for example, dealers were willing, even anxious, to sell at new, lower prices while old orders at higher levels were still moving.

Railroad grades have also experienced sharp price drops. Mills apparently are not willing to pay the high prices that were in effect a few weeks ago for even these premium grades. Low phos has also gone along with the trend.

But by any standards other than the recent record levels, the market continues strong. Export has threatened to decline on the East Coast on the basis of the international situation and, in recent days, bad weather. In Philadelphia, a major consumer was able to buy with little trou-

ble at \$2 under the price paid for cargoes now being loaded.

Pittsburgh . . . All prices dropped from \$1 to \$5. A major mill purchased No. 1 heavy melting for \$63, No. 2 heavy melting \$56, and No. 2 bundles for \$50. On the basis of prices quoted by brokers, turnings dropped \$2; low phos also fell \$2 and continues to lag. Railroad grades are also off \$3 to \$5 on an early list. Cast grades, heavy turnings, and factory bundles are down \$1 in sympathy.

Chicago . . . After a temporary halt a week ago, prices again skidded. Mill offering prices that were ignored one week ago are now bringing in increasing tonnages of scrap, despite the existence of older orders at better prices. Mill resistance, even at the new levels, continues to be stiff. In the face of the \$2 and \$3 price declines, with some grades off as much as \$5, local mills are indicating they will make new offers at even lower prices. Plummeting auto lists, coupled with new mill offers to buy, seem to be the main factors in the break.

Philadelphia . . . In spite of unusually heavy export activity, prices for most grades dropped \$2. An estimated 20,000 tons of scrap being accumulated on the docks for foreign shipment next week did slow down movement of some grades. But a large area mill was able to get what it wanted at lower prices.

New York . . . Steelmaking grades slipped slightly on the basis of mill purchases, but export still continues to peg the market to some extent. Turnings are off on sales to domestic customers. Cast grades reflect prices paid by pipe producers.

Detroit . . . Declines that began with closing of January auto lists continued this week on the basis of broker buying for a local mill. But indications are that the market has firmed for the time being on new

price levels. New buying places No. 1 grades at \$53, No. 2 heavy melting at \$46 and No. 2 bundles at \$41. As is generally the rule for this market, prices are expected to hold steady for the remainder of the month.

Cleveland . . . Pressure is building up for an additional price decline in Cleveland and the Valley. One Cleveland mill which has regularly made token low bids direct on local auto lists, got one last week for between \$66 and \$67. In the Valley, prices dropped another \$1 on sale of secondary grades at \$58 for No. 2 heavy melting and \$50 for No. 2 bundles. Later in the week, another needy mill declined to take No. 1 at \$65. In Cleveland, an automotive foundry bought 2 ft foundry steel at \$59 and 2 ft structural and plate went for \$67. Factory lists all went for between \$66-\$67, or \$5 below a month ago.

Birmingham . . . The largest consumer in this area continues out of the market. An Atlanta mill this week bought No. 2 heavy melting at a price \$2 under its last purchase. There is some debate over whether this constitutes the market, in view of the continued export pressure.

St. Louis . . . Prices are off in varying degrees throughout the entire list. In some cases, lower prices are narrowing the differentials between grades. Movement of scrap has exceeded consumption in recent weeks, contributing to the decline.

Cincinnati . . . Prices slipped another \$2 as area mills came into the market for the month. Tonnage for one mill was below normal, indicating they might buy again later at lower prices. Market is in balance with no pressuring for shipments and no reaching out to get it.

Buffalo . . . The area's biggest buyer purchased substantial tonnages of steelmaking grades at quoted price. The expected price drop failed to materialize on the strength of the new orders. However, all railroad grades are off \$2.

Boston . . . Export has suffered somewhat from the storms in the Atlantic. With no loading possible, shipments to the docks has been curtailed.

West Coast . . . Exporting is at a terrific pace. Coupled with top mill production, it has resulted in higher prices all along the coast.



Roebling Royal Blue Wire Rope will bend and bend and bend!

What's more, Roebling Royal Blue is *stronger* than the strongest wire rope previously available. It will do more work and last longer on *your* job. Call your distributor or your nearest Roebling office for full information about Royal Blue, the really better wire rope. John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Distributors, Branches and Warehouses Throughout the Country—Subsidiary of The Colorado Fuel and Iron Corporation

Scrap Prices (Effective Jan. 8, 1957)

Pittsburgh

No. 1 hvy. melting	\$62.00 to \$63.00
No. 2 hvy. melting	55.00 to 56.00
No. 1 dealer bundles	62.00 to 63.00
No. 1 factory bundles	70.00 to 71.00
No. 2 bundles	49.00 to 50.00
Machine shop turn.	41.00 to 42.00
Mixed bor. and ms. turn.	41.00 to 42.00
Shoveling turnings	46.00 to 47.00
Cast iron borings	46.00 to 47.00
Low phos. punch'gs plate	70.00 to 71.00
Heavy turnings	57.00 to 58.00
No. 1 RR. hvy. melting	66.00 to 67.00
Scrap rails, random lgth.	75.00 to 76.00
Rails 2 ft and under	79.00 to 80.00
RR. steel wheels	72.00 to 73.00
RR. spring steel	72.00 to 73.00
RR. couplers and knuckles	72.00 to 73.00
No. 1 machinery cast	60.00 to 61.00
Cupola cast	53.00 to 54.00
Heavy breakable cast	51.00 to 52.00

Chicago

No. 1 hvy. melting	\$59.00 to \$60.00
No. 2 hvy. melting	50.00 to 51.00
No. 1 dealer bundles	60.00 to 61.00
No. 1 factory bundles	64.00 to 65.00
No. 2 bundles	45.00 to 46.00
Machine shop turn.	37.00 to 38.00
Mixed bor. and turn.	39.00 to 40.00
Shoveling turnings	39.00 to 40.00
Cast iron borings	39.00 to 40.00
Low phos. forge corps	69.00 to 70.00
Low phos. punch'gs plate	66.00 to 67.00
Low phos. 3 ft and under	64.00 to 65.00
No. 1 RR. hvy. melting	66.00 to 67.00
Scrap rails, random lgth.	78.00 to 80.00
Rerolling rails	89.00 to 90.00
Rails 2 ft and under	85.00 to 86.00
Locomotive tires, cut	69.00 to 70.00
Cut bolsters & side frames	69.00 to 70.00
Angles and splice bars	74.00 to 75.00
RR. steel car axles	88.00 to 89.00
RR. couplers and knuckles	68.00 to 69.00
No. 1 machinery cast	56.00 to 57.00
Cupola cast	51.00 to 52.00
Heavy breakable cast	48.00 to 49.00
Cast iron brake shoe	48.00 to 49.00
Cast iron wheels	57.00 to 58.00
Malleable	71.00 to 72.00
Stove plate	48.00 to 49.00
Steel car wheels	71.00 to 72.00

Philadelphia Area

No. 1 hvy. melting	\$60.00 to \$61.00
No. 2 hvy. melting	53.00 to 54.00
No. 1 dealer bundles	60.00 to 61.00
No. 2 bundles	50.00 to 51.00
Machine shop turn.	44.00 to 45.00
Mixed bor. short turn.	44.00 to 45.00
Cast iron borings	44.00 to 45.00
Shoveling turnings	47.00 to 48.00
Clean cast chem. borings	51.00 to 52.00
Low phos. 5 ft and under	65.00 to 66.00
Low phos. 2 ft and under	67.00 to 68.00
Low phos. punch'gs	67.00 to 68.00
Elec. furnace bundles	64.00 to 65.00
Heavy turnings	55.00 to 56.00
RR. steel wheels	71.00 to 72.00
RR. spring steel	71.00 to 72.00
Rails 18 in. and under	80.00 to 81.00
Cupola cast	55.00 to 56.00
Heavy breakable cast	58.00 to 59.00
Cast iron car wheels	64.00 to 65.00
Malleable	66.00 to 67.00
Unstripped motor blocks	44.00 to 45.00
No. 1 machinery cast	60.00 to 61.00

Cleveland

No. 1 hvy. melting	\$62.00 to \$63.00
No. 2 hvy. melting	54.00 to 55.00
No. 1 dealer bundles	62.00 to 63.00
No. 1 factory bundles	66.00 to 67.00
No. 2 bundles	46.00 to 47.00
No. 1 busheling	62.00 to 63.00
Machine shop turn.	35.00 to 36.00
Mixed bor. and turn.	38.00 to 39.00
Shoveling turnings	38.00 to 39.00
Cast iron borings	38.00 to 39.00
Cut struct'r'l & plates, 2 ft. & under	66.00 to 67.00
Drop forge flashings	62.00 to 63.00
Low phos. punch'gs, plate	63.00 to 64.00
Foundry steel, 2 ft & under	58.00 to 59.00
No. 1 RR. heavy melting	65.00 to 66.00
Rails 2 ft and under	80.00 to 81.00
Rails 18 in. and under	81.00 to 82.00
Railroad grade bars	47.00 to 48.00
Steel axle turnings	43.00 to 44.00
Railroad cast	61.00 to 62.00
No. 1 machinery cast	60.00 to 61.00
Stove plate	51.00 to 52.00
Malleable	49.00 to 50.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	\$65.00 to \$66.00
No. 2 hvy. melting	57.00 to 58.00
No. 1 dealer bundles	65.00 to 66.00
No. 2 bundles	49.00 to 50.00
Machine shop turn.	35.00 to 36.00
Shoveling turnings	41.00 to 42.00
Cast iron borings	40.00 to 41.00
Low phos. plate	66.00 to 67.00

Buffalo

No. 1 hvy. melting	\$60.00 to \$61.00
No. 2 hvy. melting	50.00 to 51.00
No. 1 dealer bundles	60.00 to 61.00
No. 2 bundles	45.00 to 46.00
Machine shop turn.	34.00 to 35.00
Mixed bor. and turn.	38.00 to 39.00
Shoveling turnings	37.00 to 38.00
Cast iron borings	35.00 to 36.00
Low phos. plate	65.00 to 66.00
Scrap rails, random lgth.	63.00 to 64.00
Rails 2 ft and under	79.00 to 80.00
RR. steel wheels	65.00 to 66.00
RR. spring steel	60.00 to 61.00
RR. couplers and knuckles	74.00 to 75.00
No. 1 machinery cast	54.00 to 55.00
No. 1 cupola cast	48.00 to 49.00

Detroit

No. 1 hvy. melting	\$52.00 to \$53.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 dealer bundles	52.00 to 53.00
No. 2 bundles	40.00 to 41.00
New bushing	52.00 to 53.00
Drop forge flashings	51.50 to 52.50
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	32.00 to 33.00
Shoveling turnings	32.00 to 33.00
Cast iron borings	32.00 to 33.00
Low phos. punch'gs. plate	52.00 to 53.00
No. 1 cupola cast	51.00 to 52.00
Heavy breakable cast	44.00 to 45.00
Stove plate	45.00 to 46.00
Automotive cast	54.00 to 55.00

St. Louis

No. 1 hvy. melting	\$55.00 to \$56.00
No. 2 hvy. melting	48.50 to 49.50
No. 1 dealer bundles	55.00 to 56.00
No. 2 bundles	44.00 to 45.00
Machine shop turn.	37.00 to 38.00
Cast iron borings	39.00 to 40.00
Shoveling turnings	39.00 to 40.00
No. 1 RR. hvy. melting	61.50 to 62.50
Rails, random lengths	78.00 to 79.00
Rails 18 in. and under	86.00 to 87.00
Locomotive tires uncut	65.50 to 66.50
Angles and splice bars	69.00 to 70.00
Std. steel car axles	83.00 to 84.00
RR. specialties	67.50 to 68.50
Cupola cast	49.00 to 50.00
Heavy breakable cast	42.50 to 43.50
Cast iron brake shoes	52.00 to 53.00
Stove plate	42.00 to 43.00
Cast iron car wheels	54.00 to 55.00
Rerolling rails	82.00 to 83.00
Unstripped motor blocks	42.50 to 43.50

Boston

No. 1 hvy. melting	\$51.00 to \$52.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 dealer bundles	51.00 to 52.00
No. 2 bundles	36.00 to 41.00
No. 1 busheling	52.00 to 53.00
Elec. furnace, 3 ft & under	54.00 to 55.00
Machine shop turn.	32.50 to 33.50
Mixed bor. and short turn.	34.00 to 35.00
Shoveling turnings	37.00 to 38.00
Clean cast chem. borings	38.00 to 39.00
No. 1 machinery cast	47.00 to 48.00
Mixed cupola cast	43.00 to 44.00
Heavy breakable cast	46.00 to 47.00
Stove plate	41.00 to 42.00
Unstripped motor blocks	33.00 to 34.00

New York

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$55.00 to \$56.00
No. 2 hvy. melting	47.00 to 48.00
No. 1 dealer bundles	44.00 to 45.00
No. 2 bundles	38.00 to 39.00
Machine shop turn.	35.00 to 36.00
Shoveling turnings	39.00 to 40.00
Cast iron borings	40.00 to 41.00
Low phos. plate	66.00 to 67.00
Angles & splice bars	66.00 to 67.00
Rerolling rails	82.00 to 83.00
Bar crops and plate	64.00 to 65.00
Structural and plate, 2 ft	61.00 to 62.00
No. 1 RR. hvy. melting	69.00 to 70.00
Scrap rails, random lgth.	74.00 to 75.00
Rails, 18 in. and under	75.00 to 76.00
Angles & splice bars	66.00 to 67.00
Rerolling rails	82.00 to 83.00
No. 1 cupola cast	52.00 to 53.00
Stove plate	51.00 to 52.00
Charging box cast	40.00 to 41.00
Cast iron car wheels	45.00 to 46.00
Unstripped motor blocks	44.00 to 45.00
Mashed tin cans	15.00 to 16.00
Elec. furnace	54.00 to 55.00

Cincinnati

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$59.00 to \$60.00
No. 2 hvy. melting	49.00 to 50.00
No. 1 dealer bundles	59.00 to 60.00
No. 2 bundles	43.00 to 44.00
Machine shop turn.	40.00 to 41.00
Mixed bor. and turn.	37.50 to 38.50
Shoveling turnings	42.00 to 43.00
Cast iron borings	37.50 to 38.50
Low phos. 18 in. & under	66.00 to 67.00
Rails, random lengths	72.00 to 73.00
Rails, 18 in. and under	86.00 to 87.00
No. 1 cupola cast	48.00 to 49.00
Heavy breakable cast	47.00 to 48.00
Drop broken cast	57.00 to 58.00

San Francisco

No. 1 hvy. melting	\$57.00 to \$59.00
No. 2 hvy. melting	55.00 to 57.00
No. 1 dealer bundles	56.00 to 58.00
No. 2 bundles	44.00
Machine shop turn.	38.00
Cast iron borings	38.00
No. 1 RR. hvy. melting	57.00 to 59.00
No. 1 cupola cast	60.00

Los Angeles

No. 1 hvy. melting	\$57.00 to \$59.00
No. 2 hvy. melting	55.00 to 57.00
No. 1 dealer bundles	56.00 to 58.00
No. 2 bundles	40.00
Machine shop turn.	37.00
Shoveling turnings	40.00
Cast iron borings	37.00
Elec. furn. 1 ft. and under (foundry)	66.00
No. 1 RR. hvy. melting	57.00 to 59.00
No. 1 cupola cast	56.00

Seattle

No. 1 hvy. melting	\$56.00 to \$58.00
No. 2 hvy. melting	53.00 to 55.00
No. 2 bundles	\$33.00 to 35.00
No. 1 cupola cast	55.00
Mixed yard cast.	55.00

Hamilton, Ont.

No. 1 hvy. melting	\$54.00
No. 2 hvy. melting	47.00
No. 1 dealer bundles	54.00
No. 2 bundles	40.50
Mixed steel scrap	46.00
Bushelings	39.50
Bush., new fact., prep'd.	52.00
Bush., new fact., unprep'd.	48.00
Machine shop turn.	31.00
Short steel turn.	35.00
Mixed bor. and turn.	28.00
Rails, re-rolling	60.00
Cast scrap	50.00



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What's Next For Texas City?

Wah Chang Corp. buys Texas City Tin Smelter . . . Will work with tungsten and tin alloys . . . Possibility of handling other metals, ferroalloys is being explored.

◆ THE TEXAS City Tin Smelter will still turn out tin. But Wah Chang Corp., which bought it from the government, will adapt part of the smelter for tungsten refining and part for production of tin alloys.

More specific plans for future operations have not been made. A team of engineers is studying the equipment. Wah Chang will take over in mid-February.

The transition to tungsten will not be difficult. Wah Chang had been sending some tungsten ore residues to Texas City for refining previous to the sale.

The continuance of tin smelting is virtually assured for two reasons: (1) straits tin, one major source of supply, is vulnerable to world events, and (2) because tin is classified as a strategic metal it is likely that the sales agreement calls for continued production of at least a token supply.

K. C. Li, chairman of Wah Chang, gave several tips as to what his company had in mind. In announcing the transaction he said that operation of the smelter will be on a much reduced scale. Mr. Li also indicated it would be necessary to benefitiate other metals and minerals "if the smelter is to be operated on an economic basis."

Reducing the scale of operations indicates that Wah Chang may sell part of the equipment. Most of the equipment was installed in 1942, much of it later.

Much of the equipment is acid-proof and would be useful to the chemical, petro-chemical and fertilizer industries. This would be economically feasible with no transportation problem. The smelter is located in the heart of chemical country with such com-

panies as Carbide & Carbon Chemicals Corp., Monsanto Chemical Co., and Pan-American Refinery for immediate neighbors.

Some of the smelter facilities can be adapted to ferroalloy production, particularly chromium and manganese.

Oil coke, an ideal reducing agent for these ores, is readily available in Texas City. There is more than adequate room for storage of ores and the slag, which is the by-product. Natural gas is available in sufficient quantity and at low enough price for the high load factor under which ferroalloy plants operate. And the site is in a good location for water transportation of both ore (almost all imported) and finished products.

Much of the smelting equipment would require a minimum of redesign to handle many secondary nonferrous metals. There is al-

most no chance that the smelter will work on copper ores. Average ore is less than 1 pct metal, uneconomical to ship. Some copper companies, however, may be interested in some of the equipment if it is put on the market by Wah Chang.

The Texas City smelter originally cost the government about \$13 million for property, plant and equipment. Its depreciated value is estimated at about \$5 million.

Wah Chang will pay the government \$1.35 million, 10 pct down and the remainder in 10 annual installments. In addition, there is an escalator clause so that the government could make another \$2 million depending on the profits of the smelter. Total maximum cost to Wah Chang would be \$3.35 million. The Texas City smelter was a war baby built without regard to economic operation.

NICKEL . . . The Commerce Dept. admits to Congress its program for rationing nickel in far from perfect. But it refuses to try a compulsory allocation program. The present system of voluntary controls is going to remain in effect indefinitely.

For small consumers, the best news in the report, required under the defense production act, is the disclosure that nickel suppliers have agreed to take another look at their customer lists, and to reschedule some allocations before end of January.

Any system of allocations is bound to have weaknesses, the report acknowledges. One of the major weaknesses of the current system is that the government does not allow for shifts in consumption, nor technological changes.

Tin prices for the week: Jan. 2—99.375; Jan. 3—99.75; Jan. 4—99.875; Jan. 7—99.50; Jan. 8—99.50.*

*Estimate.

Primary Prices

	current price (cents per lb)	last price	date of change
Aluminum Ingel	27.10	25.80	8/10/56
Aluminum pig	28.00	24.00	8/10/56
Copper (E)	38.00	40.00	10/28/56
Copper (CS)	35.00	35.50	12/20/56
Copper (L)	38.00	40.00	10/27/56
Lead, E. St. L.	15.80	18.30	1/13/56
Lead, N. Y.	18.00	18.50	1/13/56
Magnesium Ingel	38.00	34.50	8/13/56
Magnesium pig	38.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/56
Titanium sponge	250-275	270-300	12/4/56
Zinc, E. St. L.	13.00	13.00	1/8/56
Zinc, N. Y.	14.00	13.00	1/8/56

ALUMINUM: 99% Ingol frt allwd. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig. Velasco, Tex. NICKEL: Port Colbourne, Canada. ZINC: prime western. TIN: see column at right, other primary prices, pg. 116.

Monthly Average Metal Prices

(Cents per lb except as noted)
Average prices of the major nonferrous metals in December based on quotations appearing in THE IRON AGE, were as follows.

Electrolytic copper, del'd	
Conn Valley	36.00
Copper, Lake	36.00
Straits Tin, New York	104.281
Zinc, E. St. Louis	13.50
Lead, St. Louis	15.80
Aluminum Ingol, frt allwd'	27.10

Note: Quotations are going prices.



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SIZE	Across Flats		Shoulder Height		Across Corners	Height +.000 -.003
	MAX.	MIN.	MAX.	MIN.		
0-80 NF-3B	.111	.107	.047	.042	.123	.075
1-64 NC-3B	.127	.123	.0635	.0585	.141	.090
1-72 NF-3B	.127	.123	.0635	.0585	.141	.090
2-56 NC-3B	.158	.153	.068	.063	.176	.105
2-64 NF-3B	.158	.153	.068	.063	.176	.105
3-48 NC-3B	.190	.183	.071	.066	.210	.120
3-56 NF-3B	.190	.183	.071	.066	.210	.120
4-40 NC-3B	.190	.183	.072	.067	.210	.120
4-48 NF-3B	.190	.183	.072	.067	.210	.120

SPECIFICATIONS: Available in brass (plain or cadmium plated) and aluminum (plain or chemically treated), for temperatures to 250°F; alloy steel, 18-8 stainless, for temperatures to 550°F.



New FLEXLOC Microsize locknuts are smaller and lighter than regular FLEXLOCS of the same nominal diameter. Wrenches of smaller size are used to install them. Mating joints or flanges can be designed smaller—with no loss in strength or convenience of assembly.

Microsize FLEXLOCS have all the advantages of larger FLEXLOCS. One-piece, all-metal construction—nothing to put together, come apart, lose or forget. Use them as lock or stop nuts—they stay put anywhere on a threaded member as soon as the locking threads are fully engaged. Uniform locking torques insure accurate preloading. There are no nonmetallic inserts to pop out or deteriorate. Moisture, dryness, oil won't affect these Microsize FLEXLOCS. Just screw them on. They lock and stay locked. Vibration won't shake them loose.

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STANDARD PRESSED STEEL CO.

FLEXLOC LOCKNUT DIVISION

SPS
JENKINTOWN PENNSYLVANIA

Nonferrous Prices (Effective Jan. 8, 1957)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate (*"F"* temper except 6061-0)

Alloy	.032	.081	.136	.249	.250
1800, 1100,					
3003.....	44.3	42.1	40.9	40.2	
5052.....	51.8	46.8	45.1	42.9	
6061-0.....	48.9	44.6	42.8	42.6	

Extruded Solid Shapes

Factor	6063-T-5	6062-T-6
6-8.....	45.5-47.3	61.3-65.1
12-14.....	46.2-47.7	62.2-66.8
24-26.....	49.4-49.5	73.1-77.8
36-38.....	58.3-59.0	97.4-101.0

Screw Machine Stock—2011-T-3

Size*	3/8	3/8-5/8	5/8-1	1 1/4-1 1/2
Price	59.7	58.8	57.4	55.2

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"	72	96	120	144
.019 gage.....	\$1.352	\$1.803	\$2.254	\$2.704
.024 gage.....	1.686	2.252	2.815	3.378

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type	Gage	250	250	.188	.081	.032
AZ31B Stand, Grade		67.9	69.0	77.9	103.1	
AZ31B Spec.		93.3	95.7	108.7	171.3	
Tread Plate		70.6	71.7			
Tooling Plate	73.0					

Extruded Shapes

Factor	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

"A" Nickel	Monel	Inconel	
Sheet, CR.....	113	97	118
Strip, CR.....	111	99	128
Rod, bar, HR.....	94	80	99
Angles, HR.....	94	80	99
Plates, HR.....	107	96	111
Seamless tube.....	144	120	190
Shot, blocks.....		78	...

COPPER, BRASS, BRONZE

(Freight included on 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	58.13	.....	55.36	58.32
Brass, 70/30	50.19	50.73	50.13	53.10
Brass, Low	53.40	53.94	53.34	56.21
Brass, R.L.	54.54	55.08	54.48	57.35
Brass, Naval	54.14	.....	48.45	57.55
Munts Metal	52.19	.....	48.00	.....
Comm. Ba.	56.23	56.77	56.17	58.75
Mang. Ba.	57.88	.....	51.98	.....
Phos. Ba. 5%	77.25	.....	77.25	.....

Steel deoxidizing aluminum, notch bar, granulated or shot

Grade 1—95-97 1/2%..... 23.75-24.50
Grade 2—92-95%..... 22.75-23.50
Grade 3—90-92%..... 22.00-22.75
Grade 4—85-90%..... 21.25-22.00

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

Heavy	Turnings
Copper.....	32
Yellow brass.....	24%
Red brass.....	28%
Comm. bronze.....	29%
Mang. bronze.....	23%
Yellow brass rod ends.....	24%

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire.....	29 3/4-30
No. 2 copper wire.....	28 1/4-28 1/2
Light copper.....	26-26 1/4

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire.....	29 3/4-30
No. 2 copper wire.....	28 1/4-28 1/2
Light copper.....	26-26 1/4
No. 1 composition.....	27
Hvy. yellow brass solids.....	20
Brass pipe.....	20
Radiators.....	22

Aluminum

Mixed old cast.....	16 1/2-17 1/2
Mixed new clips.....	17-18
Mixed turnings, dry.....	16 1/2-17

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass
No. 1 copper wire.....
No. 2 copper wire.....
Light copper.....
No. 1 composition.....
No. 1 composition turnings.....
Cocks and faucets.....
Clean heavy yellow brass.....
Brass pipe.....
New soft brass clippings.....
No. 1 brass rod turnings.....

Aluminum

Alum. pistons and struts.....	6 1/2-7
Aluminum crankcases.....	12-12 1/2
1100 (2S) aluminum clippings.....	15-15 1/2
Old sheet and utensils.....	12-12 1/2
Borings and turnings.....	8-8 1/2
Industrial castings.....	12-12 1/2
2024 (24S) clippings.....	13 1/2-14

Zinc

New zinc clippings.....	7-7 1/2
Old zinc.....	4 1/2-5
Zinc routings.....	2 1/2-3
Old die cast scrap.....	2 1/2-3 1/2

Nickel and Monel

Pure nickel clippings.....	31.75-\$1.85
Clean nickel turnings.....	31.50-\$1.60
Nickel anodes.....	31.75-\$1.85
Nickel rod ends.....	31.75-\$1.85
New Monel clippings.....	75-80
Clean Monel turnings.....	70-75
Old sheet Monel.....	70-80
Nickel silver clippings, mixed.....	21
Nickel silver turnings, mixed.....	18

Lead

Soft scrap lead.....	12 1/2-13
Battery plates (dry).....	6 1/2-7
Batteries, acid free.....	4-4 1/4

Miscellaneous

Block tin.....	77-78
No. 1 pewter.....	61-62
Auto babbitt.....	40-41
Mixed common babbitt.....	13-13 1/2
Solder joints.....	18-18 1/2
Siphon tops.....	42
Small foundry type.....	15 1/2-15 1/4
Monotype.....	14 1/2-15
Lino. and stereotype.....	13-13 1/2
Electrotype.....	12 1/2-12 1/4
Hand picked type shells.....	10-10 1/2
Lino. and stereo. dress.....	5 1/2-5 1/2
Electro. dress.....	4 1/4-4 1/2

**STEEL
PRICES**
(Effective
Jan. 8, 1957)*Italics* identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

EAST	BILLETS, BLOOMS, SLABS			PIL- ING	SHAPES STRUCTURALS			STRIP							
	Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton		Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide- Flange	Hot- rolled	Cold- rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot- rolled	Alloy Cold- rolled	
						5.05 B3	7.40 B3	5.05 B3							
Bethlehem, Pa.			\$107.00 B3												
Suffis, N. Y.	\$74.00 B3, R3	\$91.50 B3, R3	\$107.00 B3, R3		5.90 B3	5.05 B3	7.40 B3	5.05 B3	4.675 B3, R3	6.85 R7	6.95 B3				
Clayment, Del.															
Harrison, N. J.														14.55 C11	
Conshohocken, Pa.		\$96.50 A2	\$114.00 A2												
New Bedford, Mass.															
Johnstown, Pa.	\$74.00 B3	\$91.50 B3	\$107.00 B3		5.05 B3	7.40 B3									
Boston, Mass.														14.90 T8	
New Haven, Conn.															
Baltimore, Md.															
Phoenixville, Pa.						5.85 P2		5.85 P2							
Sparrows Pt., Md.															
Bridgeport, Wallingford, Conn.	\$79.00 N8	\$96.50 N8	\$107.00 N8											14.90 N7	
Pawtucket, R. I. Worcester, Mass.															
Alton, Ill.									4.875 L1						
Ashland, Ky.									4.675 A7						
Canton-Massillon, Dover, Ohio		\$94.00 R3	\$107.00 R3, T5							6.85 G4		10.10 G4		14.55 G4	
Chicago, Ill. Franklin Park, Ill.	\$74.00 U1, R3	\$91.50 U1, R3,W8	\$107.00 U1, R3,W8		5.90 U1	5.00 U1, W8	7.35 U1, Y1 6.00 W8	5.00 U1	4.675 N4 4.675 A1	6.95 A1, T8				7.75 W8 S9	14.55 A1, S9, T8
Cleveland, Ohio										6.85 A5, J3				7.75 J3	
Detroit, Mich.	\$74.00 R5		\$107.00 R5							4.775 G3, M2	6.95 M2, G3, D2, P11	7.05 G3	10.10 G3, D2	7.75 G3	
Anderson, Ind.											6.85 G4		10.10 G4		
Duluth, Minn.															
Gary, Ind. Harbor, Indiana	\$74.00 U1	\$91.50 U1	\$107.00 U1, Y1		5.90 I3	5.00 U1	7.35 U1, I3	5.25 I3	4.675 U1, I3, Y1	6.85 Y1	6.95 U1, I3, Y1	10.20 Y1	7.75 U1, Y1		
Sterling, Ill.	\$74.00 N4									4.775 N4					
Indianapolis, Ind.											7.00 C5				
Newport, Ky.														7.75 N5	
Middletown, Ohio															
Niles, Warren, Ohio Sharon, Pa.		\$91.50 SI, C10	\$107.00 SI, C10						4.675 SI, R3	6.85 T4	6.95 SI, R3	10.00 SI, R3	7.75 SI		14.55 SI
Pittsburgh, Pa. Midland, Pa. Butler, Pa.	\$74.00 U1, J3	\$91.50 U1, J3, C11	\$107.00 U1, C11		5.90 U1	5.00 U1, J3	7.35 U1, J3	5.00 U1	4.675 P6	5.750 P6 6.85 J3, B4, S7				7.75 S9	14.55 S9
Portsmouth, Ohio															
Weirton, Wheeling, Follansbee, W. Va.							5.00 W3			4.675 W3	6.85 W3, F3	6.95 W3	9.65 W3		
Youngstown, Ohio - gM	\$74.00 R3	\$91.50 Y1, C10	\$107.00 Y1			5.00 Y1	7.35 Y1		4.675 U1, Y1	6.85 Y1, C5	6.95 U1, Y1	10.20 Y1	7.75 U1, Y1		
Fontana, Cal.	\$83.50 K1	\$101.00 K1	\$128.00 K1			5.70 K1	8.05 K1	5.85 K1	5.475 K1	8.50 K1					
Geneva, Utah	\$91.50 C7					5.00 C7	7.35 C7								
Kansas City, Mo.						5.10 S2	7.45 S2		4.925 S2						
Los Angeles, Torrance, Cal.		\$101.00 B2	\$127.00 B2			5.70 C7, B2	8.05 B2		5.425 B2, C7	8.80 C7					8.95 B2
Minnequa, Colo.						5.30 C6			5.775 C6						
Portland, Ore.						5.75 O2									
San Francisco, Niles, Pittsburg, Cal.		\$101.00 B2				5.65 B2	8.00 B2		5.425 C7, B2						
Seattle, Wash.		\$105.00 B2				5.75 B2	8.10 B2		5.675 B2						
Atlanta, Ga.									4.875 A8						
Fairfield, Ala. City, Birmingham, Ala.	\$74.00 T2	\$91.50 T2				5.30 T2, R3 5.30 C16	7.35 T2		4.675 T2, R3 4.975 C10		6.95 T2				
Houston, Lone Star, Texas	\$80.00 L3	\$96.50 S2	\$112.00 S2			5.10 S2	7.45 S2		4.925 S2		7.20 S2				

STEEL PRICES

(Effective
Jan. 8, 1957)*Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.*

SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
	Hot-rolled 18 ga. & heavier	Cold- rolled	Galvanized	Enamel- ing	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* 1.25 lb. base box	Electro* 0.25 lb. base box	Holloware Enameling 29 ga.
EAST												
Bethlehem, Pa.												
Buffalo, N. Y.	4.675 B3	5.75 B3				6.90 B3	8.525 B3			5.80 W6		
Claymont, Del.												
Coatesville, Pa.												
Conshohocken, Pa.	4.725 A2	5.80 A2				6.95 A2						
Harrisburg, Pa.												
Hartford, Conn.												
Johnstown, Pa.												
Fairless, Pa.	4.725 U1	5.80 U1				6.95 U1	8.575 U1				\$9.80 U1	\$8.50 U1
New Haven Conn.												
Phoenixville, Pa.												
Sparrows Pt., Md.	4.675 B3	5.75 B3	6.30 B3			6.90 B3	8.575 B3	9.275 B3		5.90 B3	\$9.80 B3	\$8.50 B3
Worcester, Mass.										6.10 A5		
Trenton, N. J.												
Alton, Ill.										6.00 L1		
Ashland, Ky.	4.675 A7		6.30 A7	6.325 A7								
Canton-Massillon, Dover, Ohio				6.30 R3, R1								
Chicago, Joliet, Ill.	4.675 W8, A1					6.90 U1				5.80 K2	5.80 A5, R3, N4, W8, K2	
Sterling, Ill.											5.90 N4, K2	
Cleveland, Ohio	4.675 J3, R3	5.75 J3, R3		6.325 R3		6.90 R3	8.525 R3, J3			5.80 A5		
Detroit, Mich.	4.775 G3, M2	5.85 G3 5.75 M2				7.00 G2	8.625 G3					
Newport, Ky.	4.675 A9	5.75 A9										
Gary, Ind. Harbor, Indiana	4.675 U1, J3, Y1	5.75 U1, J3, Y1	6.30 U1, J3	6.325 U1, J3, Y1	6.70 U1	6.90 U1, Y1, J3	8.525 U1, Y1			5.80 Y1	\$9.70 U1, Y1	\$8.40 J3, U1, Y1
Granite City, Ill.	4.875 G2	5.95 G2	6.50 G2	6.525 G2							\$8.50 G2	7.25 G2
Kokomo, Ind.				6.40 C9						5.90 C9		
Mansfield, Ohio			5.75 E2			6.70 E2						
Middletown, Ohio		5.75 A7	6.30 A7	6.325 A7	6.70 A7							
Niles, Warren, Ohio Sharon, Pa.	4.675 S1, R1, N3	5.75 R3	6.30 R3	6.325 N3	6.70 N3	6.90 S1, R3	8.525 S1, R3				\$8.40 R3	
Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.675 U1, J3, P6	5.75 U1, J3, P6	6.30 U1, J3	6.325 U1		6.90 U1, J3, R3	8.525 U1, J3	9.275 U1		5.80 A5, P6, J3	\$9.70 J3, U1	\$8.40 U1
Portsmouth, Ohio	4.675 P7	5.75 P7								5.80 P7		
Weirton, Wheeling, Follansbee, W. Va.	4.675 W3, W5, F3		6.30 W3, W5		6.70 W3, W5	6.90 W3	8.525 W3				\$9.70 W5	\$8.40 W5
Youngstown, Ohio	4.675 U1, Y1	5.75 Y1		6.325 Y1		6.90 Y1	8.525 Y1			5.80 Y1		7.15 Y1
Fontana, Cal.	5.475 K1	6.95 K1				7.70 K1	9.725 K1				\$10.45 K1	\$9.15 K1
Geneva, Utah	4.775 C7											
Kansas City, Mo.											6.05 S2	
Los Angeles, Torrance, Cal.											6.60 B2	
Minnequa, Colo.											6.05 C6	
San Francisco, Niles, Pittsburg, Cal.	5.375 C7	6.70 C7	7.05 C7							6.45 C7	\$10.45 C7	\$9.15 C7
Seattle, Wash.												
Atlanta, Ga.												
Fairfield, Ala. Alabama City, Ala.	4.675 T2, R3	5.75 T2, R3	6.30 T2, R3							5.80 T2, R3	\$9.80 T2	\$8.50 T2
Houston, Tex.										6.05 S2		

IRON AGE		Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.										
STEEL PRICES		BARS						PLATES			WIRE	
(Effective Jan. 8, 1957)		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.125 B3	8.325 B3	7.40 B3					
	Buffalo, N. Y.	5.075 B3, R3	5.075 B3, R3	6.90 B5	6.125 B3, R3	8.325 B5, B3	7.40 B3	4.85 B3				7.20 W6
	Claymont, Del.							5.70 C4		6.85 C4	7.55 C4	
	Coatesville, Pa.							5.25 L4		6.85 L4	7.55 L4	
	Conshohocken, Pa.							4.90 A2	5.925 A2	6.85 A2	7.25 A2	
	Harrisburg, Pa.							5.80 P2	6.275 P2			
	Hartford, Conn.			7.35 R3		8.625 R3	7.40 B3					
	Johnstown, Pa.	5.075 B3	5.075 B3		6.125 B3			4.85 B3		6.85 B3	7.20 B3	
	Fairless, Pa.	5.225 U1	5.225 U1		6.275 U1							
	Newark, N. J.			7.30 W10		8.50 W10						
	Camden, N. J.			7.30 P10		8.50 P10						
	Bridgeport, Conn. Putnam, Conn.	5.30 N8	5.30 N8	7.20 N8 7.40 W10	6.20 N8	8.475 N8	7.50 N8					
	Sparrows Pt., Md.		5.075 B3					4.85 B3		6.85 B3	6.85 B3	
	Palmer, Worcester, Readville, Mass. Milton, Pa.	5.225 M7	5.225 M7	7.40 B5, C14		8.325 A5 8.625 B5					7.50 A5, W6	
	Spring City, Pa.			7.30 K4		8.50 K4					9.025 T8	
MIDDLE WEST	Alton, Ill.	5.275 L1									7.40 L1	
	Ashland, Newport, Ky.							4.85 A7, N5		6.85 N5		
	Canton, Massillon, Ohio			6.85 R3, R2	6.125 R3, T5	8.325 R3, R2, T5						
	Chicago, Joliet, Ill.	5.075 U1, R3, W8, N4 5.575 P13	5.075 U1, R3, N4 5.575 P13	6.85 A5, B5, W10, L2 W8, N9	6.125 U1, R3, W8	8.325 A5, B5, W8, L2, N9, W10	5.875 W8	4.85 U1, I3, W8, A1	5.925 U1	6.85 U1, W8	7.25 U1	
	Cleveland, Ohio	5.075 R3	5.075 R3	6.85 A5, C13		8.325 A5, C13	7.425 R3	4.95 J3, R3	5.925 J3		7.25 J3, R3	
	Detroit, Mich.	5.175 G3	5.425 G3	7.05 B5, P8 7.10 P3 6.85 R5	6.225 G3 6.125 R5	8.525 B5, P3, P8 8.325 R5	7.525 G3	4.95 G3		6.90 G3		
	Duluth, Minn.										7.20 A5	
	Gary, Ind. Harbor, Crawfordsville	5.075 U1, I3, Y1	5.075 U1, I3, Y1	6.85 R3, M5	6.125 U1, I3, Y1	8.325 R3, M4	7.425 U1, I3, Y1	4.85 U1, I3, Y1	5.925 I3	6.85 U1, Y1	7.25 U1, Y1	
	Granite City, Ill.							5.05 G2				
	Kokomo, Ind.										7.30 C9	
	Sterling, Ill.	5.525 N4	5.175 N4								7.30 K2	
	Niles, Warren, Ohio Sharon, Pa.			6.85 C10	6.125 C10, S1	8.325 C10	7.425 S1	4.85 S1, R3		6.85 S1	7.25 S1, R3	
	Pittsburgh, Pa. Midland, Pa.	5.075 U1, C1, J3	5.075 U1, J3	6.85 A5, C8, J3, R3, S9, B4, W10	6.125 U1, C11	8.325 A5, R3, S9, C8, W10, C11	7.425 U1, J3	4.85 U1, J3	5.925 U1	6.85 U1, J3	7.25 U1, J3	
	Portsmouth, Ohio							4.85 W5			7.20 P7	
WEST	Watertown, Wheeling, Follansbee, W. Va.											
	Youngstown, Ohio	5.075 U1, Y1, R3	5.075 U1, Y1, R3	6.85 U1, Y1, F2	6.125 U1, Y1	8.325 Y1, F2	7.425 U1, Y1	4.85 U1, Y1, R3		6.85 Y1	7.25 Y1	
	Emeryville, Cal.	5.825 J5	5.825 J5									
	Fontana, Cal.	5.775 K1	5.775 K1		7.175 K1		8.125 K1	5.55 K1		7.55 K1	7.95 K1	
	Geneva, Utah	5.175 C7						4.85 C7			7.25 C7	
	Kansas City, Mo.	5.325 S2	5.325 S2		6.375 S2		7.675 S2				7.45 S2	
	Los Angeles, Terrance, Cal.	5.775 C7, B2	5.775 C7, B2	8.30 R3, P14	7.175 B2	10.10 P14	8.125 B2				8.15 B2	
	Minnequa, Colo.	5.525 C6	5.525 C6					5.70 C6			7.45 C6	
	Portland, Ore.	5.825 O2	5.825 O2									
	San Francisco, Niles, Pittsburgh, Cal.	5.775 C7, P9 5.825 B2	5.775 C7, P9 5.825 B2				8.175 B2				8.15 C7, C6	
SOUTH	Seattle, Wash.	5.825 B2 N6	5.825 B2				8.175 B2	5.75 B2		7.75 B2	8.15 B2	
	Atlanta, Ga.	5.575 A8									7.40 A8	
	Fairfield, Ala. City, Birmingham, Ala.	5.075 T2, R3 5.375 C16	5.075 T2, R3 5.375 C16				7.425 T2	4.85 T2, R3		7.25 T2	7.20 T2, R3	
	Houston, Ft. Worth, Lone Star, Tex.	5.325 S2	5.325 S2		6.375 S2		7.675 S2	4.95 S2 5.20 L3		6.95 S2	7.35 S2	

† Merchant Quality—Specialty Quality .35¢ higher.

Steel Prices (Effective Jan. 8, 1957)

Key to Steel Producers

With Principal Offices

A1	Acme Steel Co., Chicago
A2	Alan Wood Steel Co., Conshohocken, Pa.
A3	Allegheny Ludlum Steel Corp., Pittsburgh
A4	American Cladmetals Co., Carnegie, Pa.
A5	American Steel & Wire Div., Cleveland
A6	Angel Nail & Chaplet Co., Cleveland
A7	Armco Steel Corp., Middletown, Ohio
A8	Atlantic Steel Co., Atlanta, Ga.
A9	Acme-Newport Steel Co., Newport, Ky.
B1	Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2	Bethlehem Pacific Coast Steel Corp., San Francisco
B3	Bethlehem Steel Co., Bethlehem, Pa.
B4	Blair Strip Steel Co., New Castle, Pa.
B5	Bliss & Laughlin, Inc., Harvey, Ill.
B6	Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
C1	Calstrip Steel Corp., Los Angeles
C2	Carpenter Steel Co., Reading, Pa.
C3	Central Iron & Steel Co., Harrisburg, Pa.
C4	Claymont Products Dept., Claymont, Del.
C5	Cold Metals Products Co., Youngstown, O.
C6	Colorado Fuel & Iron Corp., Denver
C7	Columbia Geneva Steel Div., San Francisco
C8	Columbia Steel & Shafing Co., Pittsburgh
C9	Continental Steel Corp., Kokomo, Ind.
C10	Copperweld Steel Co., Pittsburgh, Pa.
C11	Crucible Steel Co. of America, Pittsburgh
C12	Cumberland Steel Co., Cumberland, Md.
C13	Cuyahoga Steel & Wire Co., Cleveland
C14	Compressed Steel Shafting Co., Readville, Mass.
C15	G. O. Carlson, Inc., Thorndale, Pa.
C16	Connors Steel Div., Birmingham
C17	Chester Blas Furnace, Inc., Chester, Pa.
D1	Detroit Steel Corp., Detroit
D2	Dearborn Div., Sharon Steel Corp.
D3	Driver Harris Co., Harrison, N. J.
D4	Dickson Weatherproof Nail Co., Evanston, Ill.
D5	Henry Dillston Div., Philadelphia
E1	Eastern Stainless Steel Corp., Baltimore
E2	Empire Steel Co., Mansfield, O.
F1	Firth Sterling, Inc., McKeesport, Pa.
F2	Fitzsimons Steel Corp., Youngstown

F3	Follansbee Steel Corp., Follansbee, W. Va.
G2	Granite City Steel Co., Granite City, Ill.
G3	Great Lakes Steel Corp., Detroit
G4	Greer Steel Co., Dover, O.
H1	Hanna Furnace Corp., Detroit
I2	Ingersoll Steel Div., Chicago
I3	Inland Steel Co., Chicago
I4	Interlake Iron Corp., Cleveland
J1	Jackson Iron & Steel Co., Jackson, O.
J2	Jesup Steel Corp., Washington, Pa.
J3	Jones & Laughlin Steel Corp., Pittsburgh
J4	Joslyn Mfg. & Supply Co., Chicago
J5	Judson Steel Corp., Emeryville, Calif.
K1	Kaiser Steel Corp., Fontana, Cal.
K2	Keystone Steel & Wire Co., Peoria
K3	Kopper Co., Granite City, Ill.
K4	Keystone Drawn Steel Co., Spring City, Pa.
L1	Laclede Steel Co., St. Louis
L2	La Salle Steel Co., Chicago
L3	Lone Star Steel Co., Dallas
L4	Lukens Steel Co., Coatesville, Pa.
M1	Mahoning Valley Steel Co., Niles, O.
M2	McLouth Steel Corp., Detroit
M3	Mercer Tube & Mfg. Co., Sharon, Pa.
M4	Mid States Steel & Wire Co., Crawfordsville, Ind.
M5	Monarch Steel Div., Hammond, Ind.
M6	Mystic Iron Works, Everett, Mass.
M7	Milton Steel Products Div., Milton, Pa.
N1	National Supply Co., Pittsburgh
N2	National Tube Div., Pittsburgh
N3	Niles Rolling Mill Div., Niles, O.
N4	Northwestern Steel & Wire Co., Sterling, Ill.
N6	Northwest Steel Rolling Mills, Seattle
N7	Newman Crosby Steel Co., Pawtucket, R. I.
N8	Northeastern Steel Corp., Bridgeport, Conn.
N9	Nelson Steel & Wire Co.
O1	Oliver Iron & Steel Co., Pittsburgh
O2	Oregon Steel Mills, Portland
P1	Page Steel & Wire Div., Monessen, Pa.
P2	Phoenix Iron & Steel Co., Phoenixville, Pa.
P3	Pilgrim Drawn Steel Div., Plymouth, Mich.
P4	Pittsburgh Coke & Chemical Co., Pittsburgh
P5	Pittsburgh Screw & Bolt Co., Pittsburgh
P6	Pittsburgh Steel Co., Pittsburgh
P7	Portsmouth Div., Detroit Steel Corp., Detroit
P8	Plymouth Steel Co., Detroit
P9	Pacific States Steel Co., Niles, Cal.
P10	Precision Drawn Steel Co., Camden, N. J.
P11	Production Steel Strip Corp., Detroit
P13	Phoenix Mfg. Co., Joliet, Ill.
P14	Pacific Tube Co.
R1	Reeves Steel & Mfg. Co., Dover, O.
R2	Reliance Div., Eaton Mfg. Co., Massillon, O.
R3	Republic Steel Corp., Cleveland
R4	Roebling Sons Co., John A. Trenton, N. J.
R5	Rotary Electric Steel Co., Detroit
R6	Rodney Metals, Inc., New Bedford, Mass.
R7	Rome Strip Steel Co., Rome, N. Y.
S1	Sharon Steel Corp., Sharon, Pa.
S2	Sheffield Steel Div., Kansas City
S3	Shenango Furnace Co., Pittsburgh
S4	Simonds Saw and Steel Co., Fitchburg, Mass.
S5	Sweet's Steel Co., Williamsport, Pa.
S6	Standard Forging Corp., Chicago
S7	Stanley Works, New Britain, Conn.
S8	Superior Drawn Steel Co., Monaca, Pa.
S9	Superior Steel Corp., Carnegie, Pa.
S10	Seneca Steel Service Co., Buffalo
T1	Tonawanda Iron Div., N. Tonawanda, N. Y.
T2	Tennessee Coal & Iron Div., Fairfield
T3	Tennessee Products & Chem. Corp., Nashville
T4	Thomas Strip Div., Warren, O.
T5	Timken Steel & Tube Div., Canton, O.
T7	Texas Steel Co., Fort Worth
T8	Thompson Wire Co., Boston
U1	United States Steel Corp., Pittsburgh
U2	Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3	Ulbrich Stainless Steels, Wallingford, Conn.
U4	U. S. Pipe & Foundry Co., Birmingham
W1	Wallingford Steel Co., Wallingford, Conn.
W2	Washington Steel Corp., Washington, Pa.
W3	Weirton Steel Co., Weirton, W. Va.
W4	Wheatland Tube Co., Wheatland, Pa.
W5	Wheeling Steel Corp., Wheeling, W. Va.
W6	Wickwire Spencer Steel Div., Buffalo
W7	Wilson Steel & Wire Co., Chicago
W8	Wisconsin Steel Div., S. Chicago, Ill.
W9	Woodward Iron Co., Woodward, Ala.
W10	Wycoff Steel Co., Pittsburgh
W12	Wallace Barnes Steel Div., Bristol, Conn.
Y1	Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (per cent) f.o.b. mills. Base price about \$200 per net ton.

STANDARD T. & C.	BUTTWELD										SEAMLESS										
	1/2 In.	5/8 In.	1 In.	1 1/4 In.	1 1/2 In.	2 In.	2 1/2 In.	2 In.	2 1/2 In.	3 In.	2 In.	2 1/2 In.	3 In.	3 1/2 In.	2 In.	2 1/2 In.	3 In.	3 1/2 In.	4 In.		
Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.		
Sparrows Pt. B3	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75	.....	.....	.....	.....	.....	.....
Youngstown R1	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	.....	.....	.....	.....	.....	.....
Fontana KJ	0.00	+15.25	3.00	+11.25	5.50	+7.75	8.00	+7.00	8.50	+6.00	9.00	+5.50	10.50	+5.75	.....	.....	.....	.....	.....	.....
Pittsburgh J3	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50 +8.25
Alton, Ill. L1	10.50	+2.75	13.50	1.25	18.00	4.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75	.....	.....	.....	.....	.....	.....	.....
Sharon M3	12.50	+2.75	15.50	+0.75	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	.....	.....	.....	.....	.....	.....	.....
Fairless N2	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75	.....	.....	.....	.....	.....	.....	.....
Pittsburgh N1	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50 +8.25
Wheeling W5	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	.....	.....	.....	.....	.....	.....	.....
Wheatland W4	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	.....	.....	.....	.....	.....	.....	.....
Youngstown Y1	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50 +8.25
Indiana Harbor Y1	11.50	+5.75	14.50	1.25	17.00	3.75	19.50	4.50	20.00	5.50	20.50	6.00	22.00	5.75	.....	.....	.....	.....	.....	.....	.....
Lorain N2	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50 +8.25
EXTRA STRONG PLAIN ENDS	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sparrows Pt. B3	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75	.....	.....	.....	.....	.....	.....	.....
Youngstown R3	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	.....	.....	.....	.....	.....	.....	.....
Fairless N2	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75	.....	.....	.....	.....	.....	.....	.....
Fontana KJ	4.50	.....	8.50	.....	10.50	11.00	11.50	12.00	12.50	13.00	13.50	14.00	14.50	15.00	15.50	16.00	16.50	17.00	17.50	18.00	18.50 +1.25
Pittsburgh J3	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50 +6.25	14.50 +1.25	.....
Alton, Ill. L1	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75	.....	.....	.....	.....	.....	.....	.....
Sharon M3	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	.....	.....	.....	.....	.....	.....	.....
Pittsburgh N1	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50 +6.25	14.50 +1.25	.....
Wheeling W5	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	.....	.....	.....	.....	.....	.....	.....
Wheatland W4	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	.....	.....	.....	.....	.....	.....	.....
Youngstown Y1	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50 +6.25	14.50 +1.25	.....
Indiana Harbor Y1	16.00	2.25	20.00	6.25	22.00	9.75	22.50	8.50	23.00	9.50	23.50	10.00	22.00	8.75	.....	.....	.....	.....	.....	.....	.....
Lorain N2	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50 +6.25	14.50 +1.25	.....

Threads only, buttressed and seamless 2 1/4 in. pt. higher discount. Plain ends, buttressed and seamless, 3-in. and under, 5 1/2 in. pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: 1/2, 3/4 and 1-in., 2 pt.; 1 1/4, 1 1/2 and 2-in., 1 1/2 pt.; 2 1/2 and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2 1/2 and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	\$1.68	T-1
18	4	1	—	5	2.355	T-4
18	4	2	—	—	1.845	T-2
1.5	4	1.5	8	—	1.04	M-1
6	4	3	6	—	1.43	M-3
6	4	3	5	—	1.185	M-2

High-carbon chromium .83 D-3, D-5
Oil hardened manganese .45 O-2
Special carbon .41 W-1
Extra carbon .345 W-1
Regular carbon .29 W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

Cladding	Plate (A3, J2, L6)			Sheet (J2)
	10 pct	15 pct	20 pct	20 pct
302				33.25
304	34.60	38.00	41.50	35.25
316	39.70	43.20	46.65	52.25
321	36.35	39.80	43.50	42.00
347	39.50	43.95	48.45	51.00
405	29.20	33.15	37.05	—
410, 430	28.70	32.65	36.55	—

CR Strip (S9) Copper, 10 pct, 2 sides, 40.65; 1 side, 33.40.

WARE-HOUSES

City	Delivery [†] Charge	Metropolitan Price, dollars per 100 lb.											
		Sheets		Strip	Plates	Shapes	Bars		Alloy Bars				
		Hot-Rolled 18 ga. & hr.	Cold-Rolled (15 ga.)	Galvanized (16 ga.)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled As-rolled	Cold-Finished	Hot-Rolled 410 Annealed	Cold-Drawn 410 As-rolled	Cold-Drawn 410 Annealed
Atlanta	8.07	9.27	9.83	8.16	—	8.40	8.44	8.30	10.14	—	—	—	
Baltimore	8.10	7.79	8.99	9.12	8.27	—	8.12	8.57	8.34	9.09	14.99	14.44	18.39
Birmingham	15	7.68	8.88	8.85	7.78	—	8.01	8.05	7.91	10.04	—	—	—
Boston	10	8.70	9.73	11.02	8.79	—	8.98	8.90	8.85	10.71	15.05	14.45	18.51
Buffalo	15	7.90	9.05	10.87	8.15	—	8.40	8.40	8.15	8.85	15.00	14.45	18.40
Chicago	15	7.70	8.90	9.70	7.78	—	8.01	8.05	7.91	8.35	14.65	14.10	18.05
Cincinnati	15	7.85	9.05	7.93	—	—	8.16	8.20	8.06	8.50	—	—	—
Cleveland	15	7.97	9.04	9.90	8.21	—	8.49	8.70	8.34	8.97	14.93	14.38	18.33
Denver	9.55	11.09	12.41	9.70	—	9.80	9.60	9.75	10.54	—	—	—	19.79
Detroit	15	8.06	9.28	10.17	8.25	—	8.48	8.70	8.33	8.83	—	14.04	17.09
Houston	8.70	9.65	—	8.80	—	—	8.60	8.90	8.95	10.55	15.50	—	19.30
Kansas City	20	8.52	9.72	10.87	8.60	—	8.83	8.87	8.73	9.42	15.32	14.77	18.72
Los Angeles	10	8.90	10.65	11.65	9.10	—	9.35	8.95	8.88	11.70	15.85	15.35	19.70
Memphis	15	8.02	9.22	—	8.12	—	8.35	8.39	8.25	9.85	—	—	—
Milwaukee	15	7.82	9.02	9.82	7.90	—	8.13	8.24	8.03	8.57	14.77	—	18.17
New York	10	8.45	9.63	10.33	8.91	—	8.88	8.84	8.93	10.71	15.02	14.47	18.12
Norfolk	20	8.00	—	—	8.40	—	8.35	8.70	8.45	10.70	—	—	—
Philadelphia	10	7.88	9.08	9.66	8.58	—	8.28	8.38	8.37	9.12	14.80	14.15	18.20
Pittsburgh	15	7.99	9.18	10.22	8.68	—	8.38	8.48	8.47	9.22	—	14.25	17.75
Portland	8.90	9.65	11.40	9.05	—	—	8.01	8.20	7.91	8.60	14.65	13.80	18.05
San Francisco	10	8.75	10.30	10.80	8.95	—	8.85	8.85	8.88	12.30	15.85	15.35	19.45
Seattle	9.35	10.45	11.55	9.50	—	9.05	9.15	9.30	13.15	16.10	15.55	19.50	19.20
St. Louis	15	8.02	9.21	10.03	8.11	—	8.34	8.48	8.25	8.93	14.83	14.28	18.23
St. Paul	15	8.17	9.49	10.18	8.26	—	8.49	8.63	8.40	9.08	14.98	13.88	18.38

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

** F.O.B. Plant, warehouse price.

ELECTRICAL SHEETS

F.o.b. Mill Cents Per Lb	22-Gage	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length)	
			Semi- Processed	Fully Processed
Field.	9.00	9.20		
Armature.	10.35	10.35	10.85	
Elect.	11.00	11.025	11.525	
Meter.	12.65	12.075	12.575	
Dynamo.	13.05	13.05	13.55	
Trans. 72	14.05	14.05	14.55	
Trans. 65	14.60	—	—	
			Grain Oriented	
Trans. 58	15.10	Trans. 80	18.50	
Trans. 52	16.15	Trans. 73	19.00	

Producing points: Beech Bottom (W5); Brackenridge (A3); Granite City (G2); Indiana Harbor (I3); Mansfield (E2); Newport, Ky. (N5); Niles, O. (N3); Vandergrift (U1); Warren, O. (R3) (20¢ higher, HR); Zanesville, Butler (A7).

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails			
	Col	Col	Col	Col
Alabama City R3	167	181	195	187
Aliquippa, Pa. J3**	164	179	181	179
Atlanta, A5**	166	182	192	190
Bartonsville K2**	166	182	192	190
Buffalo W6	166	176	184	180
Chicago, Ill. N4**	164	180	197	195
Cleveland A6	164	173	184	180
Cleveland A5	164	173	184	180
Crawfordsville M4**	166	182	192	190
Donora, Pa. A5	164	176	190	184
Duluth A5	164	176	190	184
Fairfield, A. T2	164	176	190	184
Galveston D4	168	—	—	—
Houston S2	169	181	195	189
Johnstown, Pa. B3**	164	180	167	185
Joliet, Ill. A5	164	176	190	184
Kokomo, Ind. C9**	166	178	192	186
Los Angeles B2**	169	181	195	189
Kansas City S7**	169	181	195	189
Minneapolis C6	169	181	172	189
Monessen P6	167	185	191	180
Pittsburgh, Cal. C7	166	199	—	204
Portsmouth P7	—	—	—	7.95
Rankin, Pa. A5	164	176	184	175
St. Chicago R3	167	181	195	187
S. San Francisco C6	166	181	214	180
Sparrows Pt. B3**	166	172	192	190
Siruthers, O. Y1*	170	—	—	7.95
Worcester A5	170	—	—	8.25
Williamsport, Pa. S3	175	—	—	—

* Zinc less than 10¢. † Plus zinc extras.

** 13.5 zinc. ‡ Wholesalers only.

*** 10¢ zinc.

† On Application.

C-R SPRING STEEL

F.o.b. Mill	CARBON CONTENT				
	0.26 0.40	0.41 0.60	0.61 0.80	0.81 1.05	1.06- 1.35
Baltimore, Md. T8	8.25	10.10	12.30	15.30	18.25
Bristol, Conn. W12	—	—	12.30	15.30	18.25
Boston T8	8.50	10.10	12.30	15.30	18.25
Buffalo, N. Y. R7	7.95	9.80	12.60	15.00	17.95
Carnegie, Pa. S3	—	—	9.80	12.00	15.00
Cleveland A5	7.95	9.80	12.00	15.00	17.95
Detroit D1	8.05	9.90	12.10	15.10	18.25
Detroit D2	8.05	9.90	12.10	15.10	17.95
Dover, O. C4	7.95	9.80	12.00	15.00	17.95
Franklin Park, Ill. T8	8.05	9.80	12.60	15.00	17.95
Harrison, N. J. C11	—	—	12.30	15.30	18.25
Indianapolis C5	8.10	9.95	12.60	15.00	17.95
New Haven, Conn. D1	8.40	10.10	12.30	15.30	18.25
Pawtucket, R. I. N7	8.50	10.10	12.30	15.30	18.25
Pittsburgh S7	7.95	9.80	12.60	15.00	17.95
Rivervale, Ill. A1	8.05	9.80	12.00	15.00	17.95
Sharon, Pa. S1	7.95	9.80	12.60	15.00	17.95
Trenton R4	—	—	10.10	12.90	15.30
Wallingford W1	8.40	10.10	12.30	15.30	18.15
Warren, Ohio T4	7.95	9.80	12.60	15.00	17.95
Waukegan, Ill. W3	7.95	9.80	12.60	15.00	17.95
Worcester, Mass. A5	8.50	10.10	12.30	15.30	18.25
Youngstown C5	7.95	9.80	12.60	15.00	17.95

Saving Money in Tight Spots...



with a **UNIONMELT**
Flexible Welder

A UNIONMELT flexible welder simplifies and speeds fabrication of railroad hopper car.

Wherever flexibility and maneuverability are required in welding, the UNIONMELT flexible welder far outperforms rigid, mechanical installations . . . Welding in corners and in tight spots is no problem with this sturdy portable unit, and top quality welds are produced at speeds up to 40 inches per minute in many operations. The combination hopper and welding head is lightweight, and requires no special skill to operate.

Combines Advantages

This UNIONMELT flexible welder combines the speed of

mechanized installations with the operational freedom of manual welding. Wire feed unit and controls are mounted on a mobile carriage which can be moved quickly from one job to another, or from point to point on the same job. Initial investment for flexible welding equipment is considerably less than for stationary automatic welding installations—operations are economical, and maintenance costs are low.

For more information on this and other modern methods for joining metals, call your local LINDE representative, or write for free illustrated literature.

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation
30 East 42nd Street  New York 17, N. Y.

Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide.



Linde
Trade-Mark

Ferroalloy Prices

(Effective Jan. 8, 1957)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk, carloads, del'd.	67-71%
Cr, 30-1.00% max. Si.	
0.02% C ... 41.50	0.20% C ... 38.50
0.03% C ... 41.00	0.50% C ... 38.25
0.06% C ... 39.50	1.00% C ... 37.50
0.10% C ... 39.00	1.50% C ... 37.35
0.15% C ... 38.75	2.00% C ... 37.25
4.00-4.50% C, 67.70% Cr, 1-2% Si. ... 27.75	
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si. ... 27.75	
0.025% C (Simplex) ... 34.75	
0.10% C, 50-52% Cr, 2% max. Si. ... 25.75	
8.50% max. Cr, 50-55% Cr, 3-6% Si. ... 24.00	
8.50% C, 50-55% Cr, 3% max. Si. ... 24.00	

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.	
0.10% max. C ...	\$1.31
0.50% max. C ...	1.31
9 to 11% C, 33-91% Cr, 0.75% Fe. ...	1.40

Electrolytic Chromium Metal

Contract prices per lb of metal 2" x D plate (1/4" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.	
Carloads ...	\$1.29
Ton lots ...	1.31
Less ton lots ...	1.38

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.)	
Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.	
Carloads ...	44.65
Ton lots ...	48.95
Less ton lots ...	51.45

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.	
36-33% Cr, 60-65% Si, 3.00 max. Fe.	
Carloads ...	25.65
Ton lots ...	27.95
Less ton lots ...	29.45

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.	
16-20% Ca, 14-18% Mn, 53-59% Si.	
Carloads ...	24.25
Ton lots ...	26.15
Less ton lots ...	27.15

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe 1/2 in. x 12 mesh.	
Ton lots ...	20.15
Less ton lots ...	21.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-b; 35-42% Cr, 17-19% Si, 8-11% Mn, packed.	
Carload lots ...	17.20
Ton lots ...	18.70
Less ton lots ...	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.	
Carload packed ...	18.50
Ton lots to carload packed ...	19.65
Less ton lots ...	20.90

Ferromanganese

Maximum contract base price, f.o.b. lump size, base content 74 to 76 pct. Mn

Cents per lb, base content 74 to 76 pct. Mn

Producing Point per-lb

Marieetta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.

Johnstown, Pa. ... 12.75

Sheridan, Pa. ... 12.75

Philo, Ohio ... 12.75

S. Duquesne ... 12.75

Add or subtract 0.1¢ for each 1 pct. Mn above or below base content.

Briquets, delivered, 66 pct. Mn:

Carloads, bulk ... 14.80

Ton lots packed ... 17.20

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerston, Pa.	
Manganese Silicon	
16 to 19% ... 3% max. ...	\$100.50
19 to 21% ... 3% max. ...	102.50
21 to 23% ... 3% max. ...	105.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.	
Carload, packed ...	33.00
Ton lots ...	35.00
250 to 1999 lb ...	37.00
Premium for hydrogen removed metal ...	0.75

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.	
Carloads ...	33.00
Ton lots ...	35.00
250 to 1999 lb ...	37.00
Premium for hydrogen removed metal ...	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn ...	25.50
---	-------

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn ...	37.15	39.95
0.07% max. C ...	35.10	37.90
0.10% max. C ...	34.35	37.15
0.15% max. C ...	33.60	36.40
0.30% max. C ...	32.10	34.90
0.50% max. C ...	31.60	34.40
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	28.60	31.40
		32.60

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.	
Carloads bulk ...	13.80
Ton lots ...	15.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet ...	15.10

Ton lots, packed ...	17.50
	21.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$100.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$93.00.	
Ton lots ...	20.15
Less ton lots ...	21.40
	21.50

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.	
Ton lots ...	23.95
Carloads ...	22.65
98% Si, 0.75% Fe ...	24.46

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.	
Carloads, bulk ...	7.70
Ton lots, packed ...	10.50
	12.50

Electric Ferrosilicon

Contract prices, cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.	
50% Si ... 13.90	75% Si ... 16.80
65% Si ... 15.65	85% Si ... 18.50
90% Si ... 19.90	

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.	
Cast	Turnings
Ton lots ...	\$2.05
Less ton lots ...	3.40

Ferrovandium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.	
Open hearth ...	3.20
Crucible ...	3.30
High speed steel (Primos) ...	3.40

Alisifer, 20% Al, 40% Si, 40% Fe.

Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.	
Carloads ...	10.65¢
Ton lots ...	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langloeth, Pa., per pound contained Mo.

Contract basis, f.o.b. Langloeth, Pa., per pound contained Mo.	
Ton lots ...	11.28¢
	11.35¢

Ferro-columbium, 50-50%, 2 in. x D contract basis, delivered per pound contained Cb.

Contract basis, f.o.b. Langloeth, Pa., per pound contained Cb.	
Ton lots ...	6.90¢
Less ton lots ...	6.95¢

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb contained Ta.

Contract basis, f.o.b. Langloeth, Pa., per pound contained Ta.	
Ton lots ...	13.55¢
	13.55¢

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langloeth, Pa., per pound contained Mo.

Contract basis, f.o.b. Langloeth, Pa., per pound contained Mo.	
Ton lots ...	11.68¢
	11.68¢

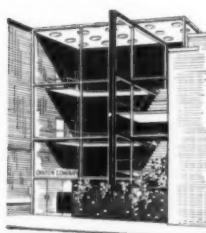
Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton.

Contract basis, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton.	

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Evidence

Best evidence of the ever-increasing importance and attention given to business publication advertising is the advertisements which appear in the pages of the business publications. This is because both advertisers and their agencies agree that the pin-point selectivity and the proved reader interest of business publication audiences make any effort but the best effort a shameful waste of money. When you have something worth saying, say it well, and say it in responsible business publications, where you can communicate with your customers and prospects in an atmosphere that is natural to them and most productive for you.



Chilton
COMPANY

Chestnut and 56th Streets • Philadelphia 39, Pennsylvania



CHILTON PUBLICATIONS: Department Store Economist • The Iron Age • Hardware Age • Spectator • Hardware World
Jewelers' Circular-Keystone • Automotive Industries • Gas • Distribution Age • Optical Journal and Review of Optometry
Motor Age • Boot and Shoe Recorder • Commercial Car Journal • Butane-Propane News • Electronic Industries • Book Division

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RAILWAY CARS

All Types

FREIGHT CAR REPAIR PARTS

For All Types of Cars

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Diesel, Steam, Gasoline,
Diesel-Electric

SPECIAL OFFERING 50-TON CAPACITY GONDOLA CARS

Length—46'0" Drop Ends
Steel Underframes Steel Ends
Steel Sides Wood Floor
AB Air Brakes
Immediate Delivery!

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Phone: BEEKMAN 3-8230

**"ANYTHING containing IRON
or STEEL"**

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

The Tool Dragnet . . . There's continuing heavy sales volume reported by all Chicago dealers who have a fair stock of equipment or sufficient contacts outside the midwest to lay their hands on more equipment on short notice.

Equipment built later than 1945 is being snapped up. An indication of the strength of the local market: used tool men are making little attempt to capture sales in other areas. On the contrary, they are combing Michigan, Ohio, Pennsylvania, and New York in the search for equipment that can be shipped in to waiting buyers in the immediate Chicago area.

For Home Use . . . Even down-river traffic to St. Louis, Kansas City and the New Orleans area is being cut back by Chicago area tool sellers who have more business than they can handle in their own hometown.

One explanation for the tightening in the market: a number of small buyers who've been holding off in the faint hope that money might get a little easier, are giving up and going ahead with their buying. This has helped increase machine tool sales at an even higher rate than machine tool rentals in the past few weeks. And equipment rentals are at an all-time high.

There have been some complaints that considerable government surplus equipment is going on the auctioneer's block and that this could produce a market softening. In practice, however, the government surplus seems to have been snapped up and customers are still buying by telephone. Buyer complaints about current price levels don't seem to have affected willingness to buy.

Empty Storerooms . . . Major headache in used tool circles is approach of the spring selling season with inventories at levels that haven't been this low since the boom sales levels of the Korean War period. With a record Feb-

ruary-March sales period looming ahead, dealers have been unable to stock equipment in quantity, and have been turning down orders they couldn't fill since late November.

With Detroit having an upturn in demand, with West Coast calls representing a somewhat poorer profit margin than can often be obtained by trading this side of the Rockies, Midwest tool sellers feel that their only hope for restocking may be the very mild slowdown in the East. And even that offers very little hope. With the result that the first quarter sales outlook is very good—but only for those with something left to sell.

Heavy Equipment Wanted . . . Confidence is dominating the New York market in the opening month of the New Year.

Hottest segment of the market at present continues to be heavy equipment. Lighter tools can not be called truly soft, but the real pressure is for the heavy stuff. Tool room demand continues good, with requests for surface grinders singled out for special attention. Conversely, requests for cylindrical grinders are coming in at a substantially slower rate.

One dealer describes demand for sheet metal equipment as "pretty good" especially in sizes suitable for shipyards and other marine work. He adds there are an interesting number of orders for this type of equipment from firms in the atomic energy field.

Miller Buyers Choosy . . . Milling machine customers are interested but a little choosy. Interest is less in type, than in year. Any but late model machines get little more than a glance, although late 3s, 4s, 5s and both verticals and horizontals are moving briskly.

Despite seasonal slumps in overall construction activity, demand for machinery in this area continues good. Demand for iron-workers is particularly strong.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDING ROLLS

8' x 1" Low Initial Type
8' x 1" Weight 1200 Vertical
10' x 1" King Initial Type
10' x 1" King Pyramid Type
12' x 1" Southward Pyramid Type
10' x 1" Niles Pyramid Type
20' x 1" Hilles & Jones Pyramid Type

BRAKES—LEVER TYPE

12' x 1" Drefs & Krump
12' x 1" Drefs & Krump

BRAKES—PRESS TYPE

10' x 1" Superior Hydraulic—NEW
10' x 1" Superior Hydraulic—NEW
12' x 1" Superior Hydraulic—NEW

CRANES—OVERHEAD ELECTRIC TRAVELING

10 ton Shaw 220/300 A.C.
5 ton Shaw 120/180 A.C.
10 ton P&H 300 A.C.
10 ton Cleveland 47' Span 440/3/60 A.C.
15 ton P&H 48' Span 230 Volt D.C.
15 ton Morgan 70' Span 220/2/60 A.C.
15 ton P&H 70' Span 230 Volt D.C.
20 ton Cleveland 70' Span 220/2/60 A.C.
120 ton Niles 68' Span 440/3/60 A.C.

DRAW BENCH

10,000# Aetna Standard, Length of Draw 44', Used
to draw SAE 1635 Welded Steel Tubing

FORGING MACHINES

to 5' Activa, Ajax, National
3" W. & Sons, XN, Air Clutch, NEW 1954

GRINDER—ROLL

20" x 90" Landis, Crownin Drive

HAMMERS—BROAD DROP—STEAM DROP—STEAM FORGING

FORGING—800 lb. to 20,000 lb.

• Manufacturing

Confidential Certified Appraisals

Liquidations — Bona Fide Auction Sales Arranged

REBUILT — GUARANTEED ELECTRICAL EQUIPMENT

MOTOR GENERATOR SETS

Qu.	K.W.	H.P.M.	Make	Volts	D.C.	Volts	A.C.
1	1250	720	G.E.	600		2300/4160	
1	1000	720	Whse.	600		2300/4160	
1	500	1200	Whse.	125/250		2300/440	
1	500	720	Cv. Wh.	575/600		2300	
1	300	1200	Al. Ch.		2300		
		3-unit		2300			
1	300	1200	G.E.	2300			
1	200	1200	Cv. Wh.	2300			
1	200	1200	Elliott	185		4000/2300	
1	200	900	G.E.	230		2300	
1	175	1200	G.E.	240		410/220	
2	150	1200	Whse.	250		2300/440	
3	150	1200	Reliance	125		2300/440	
1	150	1200	G.E.	250		2300	
1	100	1200	Whse.	125/250		410/220	
1	100	1200	Al. Ch.	250		4600/2300	

DIRECT CURRENT MOTORS

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	1500	Whse.	End.	525	600
1	1000	Whse.	Mill	600	150/300
1	1050	G.E.	MPC	550	36
1	875	Al. Ch.	Ext.	550	45
2	600	Al. Ch.	Mill	600	300/600
1	500	Whse.	Rev.	250	285/740
1	350	G.E.	CD 169A	230	1150
1	300	Whse.	Mill	230	300
2	275	G.E.	Mill	230	425/850
1	220	250	El. D.y.	230	400/1200
1	180	G.E.	MPC	230	400
1	150	G.E.	CD 175A	230	850/1025
1	125	G.E.	Mill	230	300/900
1	100	G.E.	Mill	230	400/600
2	80	Rel.	551 T	230	915/150
2	75	Whse.	SK	230	250/1600
1	60/80	El. D.y.	25	230	250/1600
1	50	Whse.	SK 141	230	250/1600
1	35	Whse.	SK	230	250/1600
2	30/40	Whse.	SK 143	230	500/1500
1	20/25	Whse.	SK 121	230	260/1200
8	5/7½	Rel.	TEFC	230	337/1230

T. B. MAC CABE COMPANY

4302 Clarissa St., Philadelphia 40, Penna.
Cable Address Phone
"Macsteel" Philadelphia, Pa. Davenport 4-8300

6' x 1/4" Low Initial Type Bending Roll, M.D.
No. 1 Buffalo Forge Vertical Angle Bending
Roll Leg-In Attachment, M.D.

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54" Mecan 17 Rolls 3 1/2" Dia.
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30" Southward, 1 1/2" Cap., 16 Pneu. Jacks

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500 ton Eddy 440/3/60 Single Lower Platen 38" x 66"
750 ton Baldwin Triple Acting Bolster 84 x 133"

1200 ton United Steam Hydraulic Forging Press

4500 Baldwin-Lima-Hamilton Hydr. Forging Press

PRESSES—HYDRAULIC WHEEL

600 ton N-B-P, 96" Between Strain Bars

800 ton N-B-P, 96" Between Strain Bars

PRESSES—IRONED

120" Heavy, Open Back 1 1/2" Stroke, Area of Bed

PRESSES—STRAIGHT SIDE

Cleveland IT-14 Double Acting, 20" Stroke of Slide

11" Stroke of Blankholder, Bolster 48x318"

Toledo 203E Overhang, 10" Str. 38x10" Bolster

250 ton, 10" Str. 80" x 20" Strain Bolster 30" x 30"

100 ton Toledo 58A, 11" Stroke, Bolster 36" x 36"

170 ton Biffs 57A, 14" Stroke, Bolster 32" x 32"

150 ton Toledo 281, 6" Stroke, Bolster 38" x 36"

105 ton Toledo 56, 5 1/2" Stroke, Bolster 25" x 25"

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z41 x 18 Buffalo RAP, Capacity 1/2" x 1 1/2"

Cleveland Style ED, Single End, 42" Throat

1/2" x 1 1/2" Capacity, Single End, 60" Throat

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72" Bertsch Seven Rolls, 7" Dia.

72" Bertsch Nine Rolls 14" Dia.

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18" Three High Bar Mill

12" x 12" Single Stand Two High

16" x 24" Farrel Two Stand, Two High

16" x 30" Single Stand Two High

20" x 34" United Single Stand, Two High

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22" x 14" Three High Sheet Mill

22" x 10" Three High Sheet Mill

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8" x 1 1/2" Niagara—NEW 1952

10" x 3 1/2" Niagara—NEW 1950

10" x 3 1/2" Long & Alstetter

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Lowey Flying Shear with ratchet driven measuring

rolls, Capacity 125" x 36" wide

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30" Wean Slitting Line

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26 1/2" A. Fen. Capacity 2 1/4" Tube, 3 1/2" Solid 10"

Tube Length Hydraulic Feed, LATE

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Etna 1K Welded Tube Mill, Cut-Off & Transformer

Capy. 1/2" OD 0.28 wall to 2" OD .120 wall

Equipment

Consulting Engineering Service

Surplus Mfg. Equipment Inventories Purchased

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3" bar Universal Tri-Way horizontal, table type, (2), one lathe.

GRINDING MACHINES

72" Hanchett 3-spd. rotary surface, new 1946.

14" x 36" Pratt & Whitney hyd. vert. surface, 1942.

No. 74 Heald hyd. pl. internal, X-sliding H. S., 1941.

16" x 36" Landis type C hyd. pl. cylindrical, 1942.

HAMMERS

No. 30 Chambersburg pneumatic, serial No. 2297.

No. 6-1 Nazel, pneumatic, late.

No. 6B Nazel, self-contained.

LATHES

No. 3 Gisholt Univ. Turret Lathes (2), 1942.

No. 3 Gisholt ram type Univ. Turret Lathe, 1940.

15" x 30" Lipe Carbide-Matic, 1942.

120" x 96" OD Niles Bement Pond engine lathe, 80 HP, M.D.

MILLING MACHINES

No. 2 Brown & Sharpe vertical mill, new 1943.

No. 5-48 Cincinnati hydraulic duplex mill, serial 3B51D1K-5.

No. 2-24 Cincinnati automatic simplex mill, serial No. 1B38P1-T-1.

PRESSES

200 ton No. 7-72 Bliss S.S. D.C. Press, Air Clutch.

350 ton Elmer self-cont. 4-post Hydraulic Press, 1944.

500 ton No. 1039 Hamilton D.C. adj. hed. 60" x 102".

800 ton Model 2E-48-800 Hamilton, S.S. air clutch, new 1947.

2000 ton No. 6 National Maxipress Forging Press.

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32" G & E Invincible, F.M.D.

36" Rockford hyd. vertical slotter, new 1944.

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1 1/2" National Upsetter, guided ram, hard ways.

3" Ajax upsetting & forging machine, air clutch, serial 3614.

3" National high duty forging machine, serial 14195.

3 1/2" Ajax suspended slides, steel frame.

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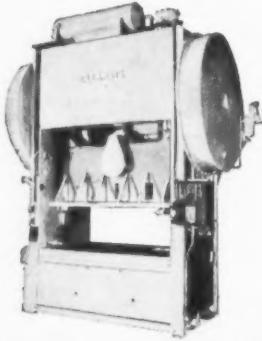
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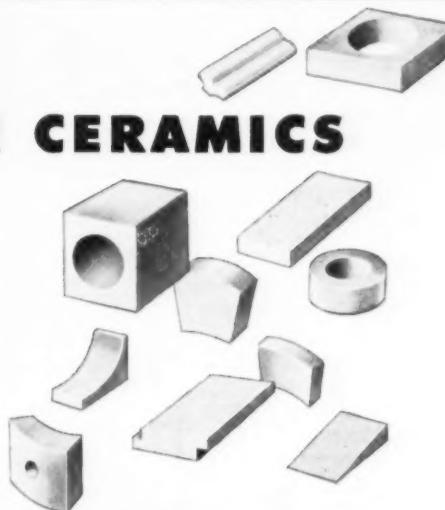
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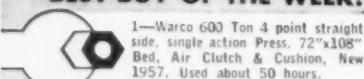
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SURPLUS STEEL****WALLACK BROTHERS**

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NOT LESS THAN 18" WIDE AND
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IS FOR A FOREIGN PLANT AND
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IRON AGE

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BUYER-P. A.—Wanted by Steel Warehouse with several branches to order product, Manager's requisitions, and to coordinate purchases and expedite deliveries. Advise experience and salary requirements. Address Box G-465, care The Iron Age, Chestnut & 56th Sts., Philadelphia 39.

SALESMAN, familiar pre-coated steel, nickel-elled, chromed, brassed and coppered, with connections in industries using same. Salary and commission. Give complete resume. Confidence respected. Address Box G-474, care The Iron Age, Chestnut & 56th Sts., Philadelphia 39.

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Multi-million dollar expansion of our operating facilities has created opportunities in industrial engineering for young men trained or experienced in wage incentive programming, methods engineering, and statistical quality control. 1 to 3 years experience will qualify. Professional status assured. Openings at our Fontana plant in Southern California.

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Employment Manager*

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P. O. Box 217, Fontana, California

ROLL TURNER—Wanted experienced roll turner for merchant mill shapes. Southern location, starting March 1st. Address Box G-468, care The Iron Age, Chestnut & 56th Sts., Philadelphia 39.

**... Don't Hide Your Light
Under A Bushel . . .**

Have something new on the market or do you just want to tell why your product does the job better? Either way, your advertisement in The IRON AGE carries more weight and reaches more prospects. More advertisers will sell through these pages in The IRON AGE this year than in any other metal-working paper.

Industry Is Too Slow, AEC Warns

The Atomic Energy Commission warned that if private industry doesn't speed up development of atomic power, the government may take over the job. The warning came in the form of an invitation to public and private groups to submit plans for reactors to be built with AEC aid. It is the third such invitation extended by the Commission.

Bethlehem and Youngstown Deny Complaint

Bethlehem Steel Corp. and Youngstown Sheet and Tube Co. filed denials of the U. S. Justice Department's complaint that a proposed merger of the two firm's would violate Sect. 7 of the Clayton Act. The companies stated that "there is not any substantial competition between Bethlehem and Youngstown in any section of the country."

Another Electric Furnace For Republic

Republic Steel Corp. announced plans for enlarging its expansion program at Gadsden, Ala. by adding a second electric furnace with a capacity of 204,000 tons a year. When both furnaces are completed, the plant's rated annual capacity will be boosted to 1,197,000 tons, making Gadsden the second largest steel-making center south of the Ohio River and East of the Rockies.

Merger Creates Vulcan Material Co.

Birmingham Slag Co., Birmingham, Ala., and Vulcan Detinning Co., Sewaren, N. J., have effected a merger to form the Vulcan Material Co. Headquarters will be in Birmingham. Both companies, whose combined assets exceed \$25 million, recover and sell slag and slag iron from blast furnaces.

Ports Vie For Ore Imports

The Delaware River Port Authority and the Greater Philadelphia Chamber of Commerce are asking the U. S. District Court at Baltimore to maintain parity on railroad rates on imported iron from Baltimore and Philadelphia to steel mills west of Pittsburgh. Baltimore wants a lower rate in order to attract ore business to its docks. But the Interstate Commerce Commission ordered the rates equalized. The court now is being asked to reaffirm the ICC order.

Mallory-Sharon Paces Titanium Output

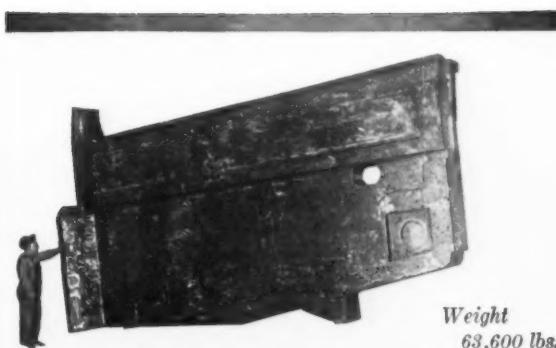
Mallory-Sharon Titanium Corp. predicts its shipments of titanium products in 1957 will total 3500 tons—more than the entire industry turned out in 1955. With the first of five new electric furnaces already installed at Niles, O., and the balance to be in operation during the first quarter, the company expects its melting operations to reach a one million-lb-a-month rate.

An asterisk beside the name of advertiser indicates that a booklet, or other information, is offered in the advertisement. Write to the manufacturer for your copies today.

A	B	C
AAA Products Co. 131	Barry Controls, Inc. 11	Canton Drop Forging & Mfg. Co., The 92
A & A Machinery 128	Belyea Co., Inc. 127	Chambersburg Engineering Co. 133
Ace Equipment & Salvage Co. 128	Bennett Machinery Co. 127	Cincinnati Gear Company, The 86
*Acme Welding Div. of The United Tool & Die Co. 54	*Beryllium Corp., The 77	*Cities Service Oil Co. 80
Alco Products, Inc. 97	Bethlehem Steel Co. 1	*Cleveland Cap Screw Co., The 105
*Allied Research Products, Inc. 13	*Bliss, E. W., Co., Rolling Mill Div. 75	*Cleveland Crane & Engineering Co., The Steelweld Machinery Div. 101
Armel, James P. 130	*Bucyrus-Erie 31	*Cleveland Worm & Gear Co. 18
Armstrong-Blum Manufacturing Co. 44		Colorado Fuel & Iron Corp., The Wickwire Spencer Steel Div. 78
Armstrong Bros. Tool Co. 92		Consumers Steel & Supply Company 131
		Copper & Brass Research Association 48
		*Corhart Refractories Co., Inc. 106
		Cowles Tool Co. 9
		Crawford, F. H., & Co., Inc. 127
		Crucible Steel Co. of America 79
		D
		Davidson Pipe Co., Inc. 130
		*DoAll Co., The 40
		Donahue Steel Products Co., Inc. 128
		Dony, D. E., Machinery Co. 130
		E
		Eastern Machine Screw Corp., The 92
		Eastern Machinery Co., The 129
		F
		Falk Corporation 127
		Ferry Cap & Set Screw Co., The I2
		Foster, Frank B., Inc. 128
		Frank, M. K. 130
		G
		*General Electric Co., Industrial Electronics Division, Broadcast Equipment 4
		Gisholt Machine Co. 94 & 95
		Goodrich, B. F., Industrial Products Company 134
		Goss & DeLeeuw Machine Co. 92
		Greenpoint Iron & Pipe Co., Inc. 130
		Griffin Manufacturing Co. 92
		H
		*Harshaw Chemical Company, The Between pages 48 & 49
		Hayward Company, The 133
		Henry, A. T. & Company, Inc. 127
		Hughes, Arnold Co. 130 & 131
		Hyman, Joseph & Sons 128
		I
		*Ingersoll Milling Machine Co., The 5
		Iron & Steel Products, Inc. 126
		Ivins, Ellwood Steel Tube Wks., Inc. 92
		K
		Kaiser Aluminum & Chemical Sales, Inc., Kaiser Chemicals Division 38
		Kaiser Steel Corp. 131
		Kaste Steel Corp. 130
		Kinderman, Lou F. 128
		L
		Laclede-Christy Division H. K. Porter Company, Inc. 91 & 129

IN THIS ISSUE

Lang Machinery Co.	130
LeBlond, R. K., Machine Tool Co., The	56 & 57
*Leeds & Northrup Co.	93
*Leschen Wire Rope Division, H. K. Porter Company, Inc.	90
Linde Air Products Co., A Div. of Union Carbide & Carbon Corp.	123
Link-Belt Co.	42
Luria Bros. & Co., Inc.	113
M	
*McCaffrey, M. P., Inc.	103
McLouth Steel Corp.	
Between pages 48 & 49	
MacCabe, T. B., Co.	127 & 128
Mesta Machine Co.	58
Miles Machinery Co.	127
*Monarch Machine Tool Co.	84 & 85
Morrison Railway Supply Co.	130
Motch & Merryweather Machinery Co.	8
N	
National Acme Co., The	29
National Business Bourse, Inc.	131
National Machinery Exchange	128
New Departure Div. General Motors Corp.	16
*Norton Co. Grinding Wheel Div.	37
O	
Ornitz Equipment Corp.	129
P	
Piscilelli, J. G., & Son	131
Platt Bros. & Co., The	92
Pope Machinery Corp.	102
Progressive Manufacturing Co. Div. The Torrington Co.	83
Purdy Company, The	130
R	
Republic Machinery Co.	129
*Republic Steel Corp.	52 & 53
Riverside Metal Co., Div. of H. K. Porter Co., Inc.	87
Rivett Lathe & Grinder, Inc.	99
Robinson Steel Warehouse	129
*Roebling's, John A., Sons Corp. III	111
*Rotor Tool Co.	46
S	
S. & S. Machinery Co.	130
Schatzmann, N. J.	129
Service Steel, Div. Van Pelt Corp.	92
Sharon Steel Corp.	6
Simonds Abrasive Co.	14 & 15
*Stalwart Rubber Company	50
*Standard Pressed Steel Co.	115
Standhope, R. C., Inc.	129 & 131
*Steelweld Div. The Cleveland Crane & Engineering Co.	101
Strom Machinery Corp.	130
*Sun Oil Co.	Between pages 98 & 99
T	
Thomas Flexible Coupling Co.	104
Timken Roller Bearing Co., The	32
U	
Union Carbide & Carbon Corp.	
Linde Air Products Co.	123
*United Air Lines	51
Universal Machinery & Equipment Co.	129
V	
Verson Allsteel Press Co.	Back Cover
Vulcan Crucible Steel Division, H. K. Porter Company, Inc.	88
W	
Wallack Bros.	131
Weiss, B. M., Co.	128
Weiss Steel Co., Inc.	131
*Wheelabrator Corporation	10
Whiting Corporation	
Inside Front Cover	
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.	78
Wilson, Lee, Engineering Co., Inc.	
Inside Back Cover	
CLASSIFIED SECTION	
Clearing House	126-130
Contract Manufacturing	
Appears in first and third issue of each month. See Jan. 3 & 17	
Employment Exchange	131
Equipment & Materials Wanted.	131



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bucket you can get—with extra
**BUCKET STAMINA
LOAD CAPACITY
DIGGING POWER**

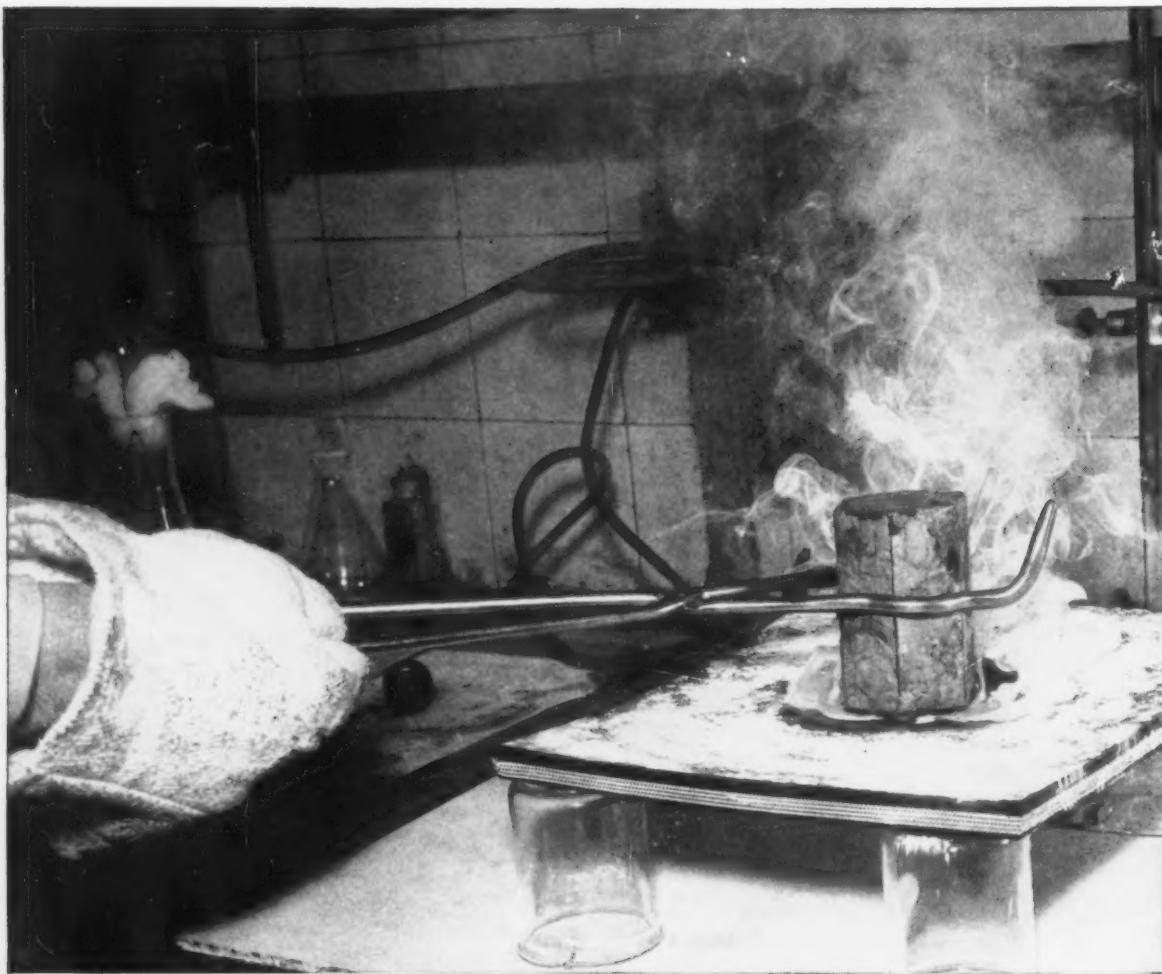
Foundries, steel mills, power plants—all acclaim this Hayward Electric Clam-Shell as the finest hook-on bucket obtainable. Handles extra large loads safely. Notable for giving many years' service with minimum maintenance. Interchangeable with your electric magnet. The Hayward Company, 50 Church St., New York 7, N. Y.

HAYWARD. BUCKETS

CLAM SHELL • ELECTRIC • ORANGE PEEL • GRAPPLES

famous for performance since 1888

B.F.Goodrich



Red-hot metal won't burn through this B.F.Goodrich conveyor belt

New fire curtain means longer life for hot-material belts

SCORCHING chunks of metal that sometimes land on foundry conveyor belts won't burn holes through a B. F. Goodrich conveyor belt with the built-in fire curtain.

This new protective shield is two layers of glass fabric that B. F. Goodrich puts into the top cover of hot-material conveyor belts. If a hot chunk of metal accidentally drops on the belt, the rubber cover chars at the spot, but only down to the glass fabric fire curtain. Since the hot object doesn't penetrate the glass fabric barrier, the belt keeps its strength and so, of course, lasts longer

than belts without this protection.

To demonstrate the effectiveness of the fire curtain, tests were run on two hot-material belts. One belt had the B. F. Goodrich fire curtain protection; the other did not. A red-hot steel bar was placed on each belt. It burned through the rubber covers on both belts. And it burned a hole clear through the unprotected belt. But the B. F. Goodrich fire curtain stopped the burning chunk, so that the body of the protected belt was undamaged.

The fire curtain protection is ideal for foundry service where burnt holes

are the major cause of short belt life. It can be built into any B. F. Goodrich hot-material belt. Talk it over with a B. F. Goodrich distributor and see if this new belting improvement is the answer to your hot material problems. *B. F. Goodrich Industrial Products Company, Dept. M-845, Akron 18, Ohio.*

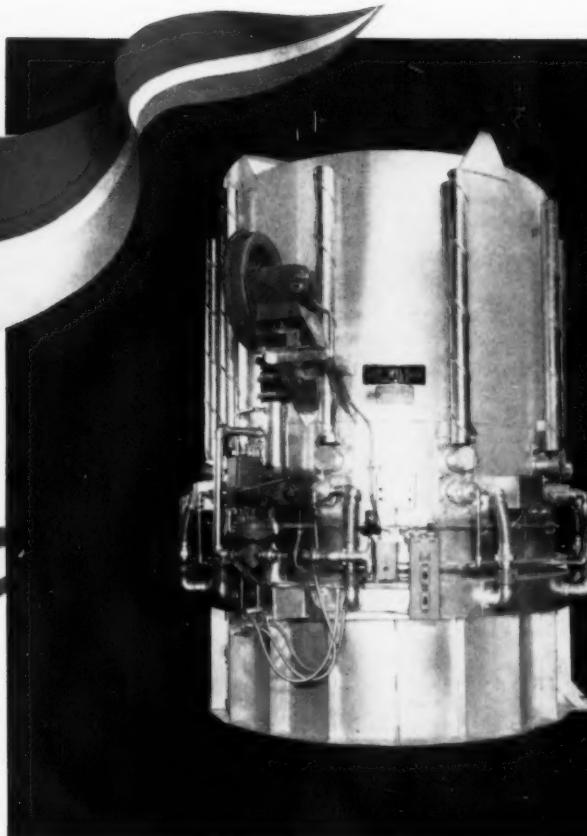
B.F.Goodrich

INDUSTRIAL PRODUCTS

THE IRON AGE



*They passed
the test with
colors flying...*



Leading steel producers are turning Pilot Single Stack Setups into production installations

Last year, more Lee Wilson Single Stack coil annealing furnaces were set into operation than ever before. These included many pilot installations where Single Stack furnaces had been under close observation for long periods of time. Users found that the Single Stack units permitted them to operate with far less process inventory and that they could get better quality, faster at less cost.

Today the Lee Wilson Single Stack furnace is the "hottest" item in the annealing field — it has passed the test with flying colors — and is destined to become the standard of the industry.

	STARTED	ADDED	TOTAL
COMPANY A	1	29	30
COMPANY B	1	24	25
COMPANY C	4	14	18
COMPANY D	1	9	10
COMPANY E	2	42	44



Lee Wilson

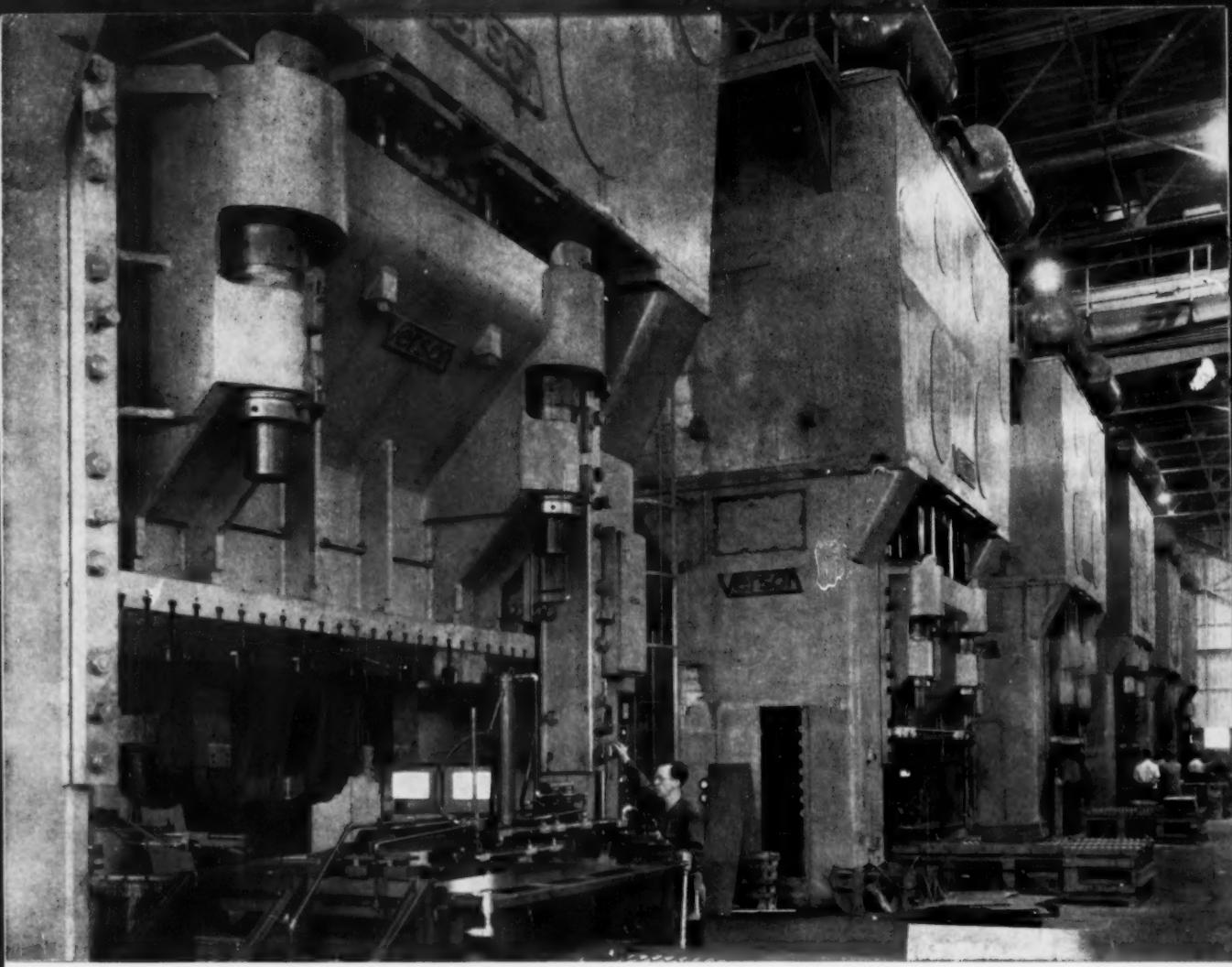
ENGINEERING
COMPANY, INC.

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SINGLE-STACK RADIANT TUBE ANNEALING FURNACES

MAKE THE BEST METALS BETTER

* ORIGINATORS AND LEADING PRODUCERS OF SINGLE-STACK RADIANT TUBE FURNACES



Could you compete with a press room like this?

the RISING COST of Obsolescence

Obsolescence is the creeping malignancy of manufacturing. The longer it goes unchecked, the weaker its victim becomes, the more costly the cure. Recent developments by Verson in the press forming of metals have obsoleted processes that were the most efficient available a few short years ago. Check your plant for symptoms.

Unless you're in the automotive industry you probably won't have to compete with this particular press room. But, if you make anything that is pressed out of metal you probably will have to compete with a press room equally modern and efficient.

What does this mean to you?

Competition that reaches its culmination in the market place often begins in the shop. Here is where a large measure of your competitive price position is determined. Here is where profits can be made—or lost.

What's the answer?

The answer is a *planned* program of

modernization of your production processes. Sit down with your suppliers and develop a program for systematically replacing inefficient, obsolete methods. Generally, you need not replace it all at once. Very often one machine at a time can be replaced, just so it is done to a well developed plan.

In your press room, sit down with Verson. Put Verson experience in the development of production processes to work for you. Utilize the know-how that results from Verson's approach to press building—"Anyone can build a press, Verson builds production processes". Write or phone.

A Verson Press for every job from 60 tons up.



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